

TROPICAL DISEASES. BULLETIN

Vol. 52]

1955

[No. 10

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Issued under the Direction of
the Honorary Managing Committee of the

BUREAU OF HYGIENE AND TROPICAL DISEASES

Keppel Street, London, W.C.1

Telephone: Museum 3041

Annual Subscription
(January-December)

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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES

BULLETIN

Vol. 52

1955

No. 10

SUMMARY OF RECENT ABSTRACTS *

VIII. TYPHUS GROUP OF FEVERS †

General

DE MAGALHÃES (p. 362) from Brazil has published a large monograph in which he sets out a classification of fevers of the typhus group under the headings of the universal forms and the American forms. These unconventional headings are elaborated in the abstract, but the original should be consulted by those interested in the subject.

The American Geographical Society (pp. 363, 788, 1153) has issued a series of valuable maps of the world distribution of louse, flea, tick and mite typhus fevers; each is accompanied by notes and a useful bibliography.

GIROUD and his colleagues have made a number of investigations of the rickettsial diseases of Africa. They (p. 365 *bis*, 785) examined the serological reactions of 113 healthy Africans who were in contact with cattle. Some positive results were given to tests for epidemic and murine typhus and boutonneuse fever, and in lower titre to Q fever. In the Belgian Congo GIROUD and JADIN (p. 902) carried out rickettsia-agglutination tests, and some complement-fixation tests, with an antigen of epidemic typhus, on various domestic animals, obtaining a number of positive results. In comment Megaw questions the specificity of the tests.

The disease known as Congolese red fever has been rather a mystery, and a team of WHO experts some years ago suggested that the name had been given to a number of different conditions, and should be abandoned. LE GAC and GIROUD (p. 901) now describe cases which Megaw, in comment, suggests somewhat resemble dengue but from which they isolated *R. burnetii*. They therefore conclude that Congolese red fever is an exanthematic form of Q fever, and on epidemiological grounds suspect *Simulium damnosum* and *Culicoides grahami* of being concerned in transmission. PELLISSIER (p. 1051), on the other hand, maintains that Congolese red fever is a benign exanthematic fever with adenopathy and an inoculation chancre, and that a rickettsia has been isolated from the blood in some cases; this organism does

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1954, v. 51. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on typhus group of fevers in this series, see the October issues of the *Tropical Diseases Bulletin* each year since 1939.

not grow well and is poorly pathogenic for guineapigs and chick embryos. Serological tests on patients indicate that this fever is of the boutonneuse-spotted-tick-bite fever group, but the author thinks that it is not identical with any. He does not consider it to be Q fever.

HUGHES (p. 48) reports a rickettsial disease of goats in the Gold Coast, speculating on its possible relationship to heartwater, murine typhus and tick typhus.

GIROUD *et al.* (p. 906) discuss the possibility that passage of rickettsiae through animals (for instance Russian strains of tick typhus in desiccated infected lung subsequently passaged through guineapigs) may promote mutation. They, and others, have observed serological affinities between *R. prowazekii* and the rickettsiae of tick-borne typhus.

Rickettsiae of the tick-typhus group, and *R. akari* and *R. burnetii*, can be cultivated in the body louse, but WEYER (p. 165) shows that *R. tsutsugamushi* has a high degree of host specificity and a poor capacity for passage through the louse. Its only known vector is a trombiculid mite.

WHITNEY and ANIGSTEIN (p. 256) have found that the administration of cortisone during the process of immunization of rabbits and guineapigs with antigens of fevers of the typhus group interferes to some extent with the formation of antibodies.

Comparative studies of the sensitivity of various techniques for the complement-fixation test with various species of rickettsiae are reported by KITAOKA and TAKANO (p. 163). Details should be sought in the original.

In an article summarizing the use of chloramphenicol, chlortetracycline (Aureomycin) and oxytetracycline in the rickettsial fevers, LEY and SMADEL (p. 1233) show that the average duration of these fevers, after the first dose, is 2-5 days. No deaths occurred in the 588 cases analysed, in which adequate treatment was given before the terminal stages of the illness. The initial loading dose of all three drugs should be 50-60 mgm. per kgm., followed by the same each day (divided into 3 or 4 doses) until defervescence. Four deaths from aplastic anaemia occurred after prolonged use of chloramphenicol, but there was no conclusive evidence that this drug was more likely than the others to cause blood dyscrasias. Recurrences after treatment are most common when the treatment is given very early, and when the rickettsiostatic action suppresses the production of antigen and therefore of antibody before complete immunity has been established. They may be prevented by administration of the drug for 1 day 6 days after the end of the standard course.

Proteus OX19 type. Vectors: louse and flea

Louse-borne

Seasonal trends and epidemic curves of louse-borne typhus in Poland are discussed by SCHÄFER (p. 256), who has made a statistical investigation in which he compares the trends in 1929-38 with those in 1941-43. In the first period the incidence was highest in spring, in the second in summer.

The subject of Brill's disease has again been discussed. SEIBOLD (p. 479) reports a case of late relapse of louse typhus 8 years after the first attack, and RUPE *et al.* (p. 902) a similar attack in a man born in Turkey who had lived in the United States since 1916. In neither case was there any evidence of recent exposure. Similarly in Paris BENOIST *et al.* (p. 786) report murine typhus in an African who had had an attack in North Africa 2 years previously; this also may have been a late relapse. [See also GIROUD *et al.* below, *Indeterminate type*; HOENIG and MOHR, *Trench fever*.] VON BORMANN (p. 478), however, who opposes the view that delayed relapses

of the Brill type occur in typhus, states that *R. prowazeki* persists in the body only during the attack or the inapparent infection, and that man cannot act as a persistent reservoir of infection. It can persist in lice for 3-4 months, and apparently healthy persons can transfer infected lice to others.

FULLER (p. 43) experimented with *Pediculus humanus corporis*, fed on blood infected with *Rickettsia prowazeki*, to find out if by this means small numbers of rickettsiae could be detected as easily as by the injection of the blood into cotton rats. Much the same results were given by the two techniques, but there are serious technical difficulties in using the lice.

FULLER (p. 785) has succeeded in passing *R. prowazeki* and *R. mooseri* serially through lice by allowing them to feed on infected material by the chick-skin membrane method. After the infected feed the lice fed daily on rabbits. He (p. 786) shows that these lice (and controls) maintained at 25.6°C. lived much longer than those maintained at 35.8°C., and that the heavier the dosage of rickettsiae the shorter the survival of the lice.

Irradiation of *R. prowazeki* with ultra-violet rays produces great reduction in infectivity but much less reduction of toxicity and less of haemolytic activity and respiratory activity (ALLEN *et al.*, p. 1048). The same authors (p. 1048) have devised a standard method of determining the haemolytic activity of washed rickettsiae, and have studied the relationship between this and toxicity. In certain conditions this test may have advantages over the mouse-toxicity test.

KRYŃSKI and RADKOWIAK (pp. 363, 1235) investigated the action of various dyes on *R. prowazeki*, noting that if the organisms were suspended in milk or serum they were considerably protected against the dyes and against the action of light. They report atypical forms which may be related to the resistance of lice to strains weakened by the dyes.

The National Research Council of the United States (p. 364) has issued a comprehensive and authoritative monograph on the pathology of louse-borne typhus which is based on material studied in Egypt during the war. The disease is essentially a vasculitis beginning with damage to the capillary endothelial cells. Myocarditis is a feature and a true rickettsial pneumonia probably occurs. The pathological changes produced in white rats and white mice after intravenous injection of various doses of *R. prowazeki* and *R. rickettsi* are described by PARKER and NEVA (p. 903). Details are given in the original; the changes resembled those described as occurring in animals after intravenous injection of influenza virus.

Skin reactions, sometimes intense, were produced by intradermal injections of formolized suspensions of *R. prowazeki* in persons who had handled rickettsiae or suffered from rickettsial diseases. MATTERN (p. 1049) shows that in some of these persons the eosinophil count was much reduced by the injection, in others it was increased. He suggests that further research into this phenomenon is needed.

Tetracycline has been found useful in the treatment of exanthematic typhus by RUIZ SÁNCHEZ *et al.* (p. 903).

Experiments with the avirulent strain E of *R. prowazeki* are reported by EVERITT *et al.* (pp. 561, 562). In volunteers, injections of certain doses gave rising titres to serological tests and slight febrile reactions may have been the result of multiplication of rickettsiae. Suitable doses produced immunity lasting at least a year, but this was inferior in degree to that following natural infection. However, it cannot be recommended for general immunization without large-scale field tests.

In Guatemala the typhus campaign is conducted by immunization and by the use of DDT. OWENS (p. 18) reports dramatic reduction in incidence.

EDDY *et al.* (p. 1312) investigated the action of certain of the newer

phosphorus insecticides, in association with synergists; they may be useful against DDT-resistant lice.

KRYŃSKI *et al.* (p. 1235) report a study of *Proteus OX 19* infection of lice, details of which are given in the original abstract. The histological picture is quite different from that produced by the toxin of *R. prowazekii*.

Flea-borne

Human cases of murine typhus are reported, for the first time, from Karnal in the plains of the Punjab (MATHUR, pp. 682, 1049).

By means of maps PRATT and GOOD (p. 904) show the distribution of the common ectoparasites of domestic rats, and of *Allodermanyssus sanguineus*, in the United States.

A monograph on domestic rats and their ectoparasites, and on the control of murine typhus in Georgia, United States, has been published by MORLAN *et al.* (p. 163). It is noted that by the second year after discontinuance of the campaign of dusting with DDT, to control the ectoparasites, the prevalence of murine typhus antibody in young rats was similar in treated and untreated areas. Control of *Xenopsylla cheopis* by DDT was effective, and it seemed that with additional effort the disease could be eradicated, but the economic feasibility of an eradication campaign remains to be proved. In a survey of a large number of rats in Oklahoma, complement-fixation tests for murine typhus were positive in only a few, and these were from establishments where human and animal food was handled. In 1952, after 6 years of the campaign against rats in the United States, the number of human cases of murine typhus was less than 12 per cent. of the number 7 years earlier and the rate of positive complement-fixation tests in rats only 6.7 per cent. of the earlier rate. MOHR *et al.* (p. 479) discuss these findings and rat infestation of farms and urban areas in relation to temperature and moisture.

As a result of an extensive investigation, SMITH (p. 1050) observes that the house mouse is not important in the epidemiology of murine typhus in Mississippi.

WHITMIRE and DOWNS (p. 905) show that cortisone greatly increases the susceptibility of mice to murine typhus, although different strains of mice show great variation in their reactions. By using mice treated with cortisone more rapid diagnosis will be possible, and the infections can more readily be studied.

A method of purification of yolk-sac cultures of *R. mooseri* is described by KARP (p. 905). This enables a study to be made of the metabolic processes of the rickettsiae which live inside the cells of their hosts. The power of oxidizing glutamate is a characteristic property of rickettsiae.

PATTERSON *et al.* (p. 480) describe a series of experiments in which the toxins of *R. mooseri* were injected into rabbits, rats and mice. In rabbits haemolysis was a feature, but this was not the case with rats and mice, which developed signs of haemo-concentration indicating damage to capillary walls. It is important to employ several species of animals in such work.

BOVARNICK *et al.* (p. 362) show that diphosphopyridine nucleotide has an effect on the stability of typhus rickettsiae.

Experiments by JO (p. 481) indicate that in immunized rats the maternal antibodies are transmitted to the offspring by the placental route and also by milk, but in guineapigs by the placenta only.

Although administration of oxytetracycline at the same time as intra-dermal injection of living murine typhus rickettsiae into rabbits caused great reduction in the local reaction and the production of agglutinating

antibodies, GIROUD and CIACCIO (p. 1050) found in some cases a considerable degree of antibody production with doses which caused no pronounced local reaction.

Proteus OXK type. Vector: mite

Scrub typhus is reported from various parts of India; from the large industrial town of Jamshedpur by SWAMY and DUTTA (p. 366) who note that cases occur during the rainy season and who found *Trombicula deliensis* on the local rats; from the Karnal District of the Punjab by MATHUR and his colleagues (pp. 683, 1051) and from Bombay by SOMAN (p. 1051). This last author isolated 21 strains of *R. tsutsugamushi* from patients whose sera were positive to the *Proteus OXK* reaction. He remarks that the number of reactors has declined greatly in recent years, probably because sanitation has improved. No *T. deliensis* were found on mites collected from rats, and injection of the pooled mites into mice did not produce the disease. In a tea estate in Assam, outbreaks of scrub typhus occurred in the winters of several years and NORMAN (p. 164) thinks that the seasonal incidence was connected with employment which necessitated entry into the infected area in those months. In cases not treated with chloramphenicol the fatality rate was 42 per cent., but in those in whom this drug was used there were no deaths.

Scrub typhus occurs in Hong Kong, where STEWART (p. 787) reports several cases. He notes that most occurred in the hot rainy season, and that *Trombicula deliensis* has been found in rats there at that season.

In bandicoots and in the pool of *Rattus rattus thai* from Siam TRAUB *et al.* (p. 787) for the first time isolated (in the United States) two strains of *R. tsutsugamushi* which conformed in all respects with standard strains.

AUDY (p. 44) reports 3 new species of Trombiculid mites on bats in Malaya; such mites are closely related to *Trombicula akamushi*. A study of the Trombiculid mites of New Guinea and Luzon is reported by MOHR (p. 905), who examined wild rodents there. *Trombicula deliensis* was the most commonly found mite, and was found in a wide range of habitats, from dense jungle to banana plantation, but *T. akamushi* was found only in the more open zones of grassy scrub. SASA and MIURA (p. 683) have studied the life history of several species of Trombiculid mites in Japan, including *Trombicula akamushi*.

In Malaya WISSEMAN *et al.* (p. 684) treated scrub typhus patients with cortisone as well as chloramphenicol, but the benefit was not much different from that with chloramphenicol alone. In certain severe cases of typhoid fever cortisone was quite valuable.

KATSURA (p. 481) found erythromycin valuable in the treatment of patients with scrub typhus who had relapsed after treatment with chloramphenicol, chlortetracycline or oxytetracycline.

Indeterminate type. Vector: tick

Cases are sometimes seen in which serological tests for boutonneuse fever are positive and there are pulmonary manifestations but neither a *tache noir* nor an inoculation eschar. GIROUD *et al.* (p. 366) describe such cases from French Equatorial Africa, and suggest that they may be recrudescences of latent infections in badly nourished people exposed to sudden spells of cold weather.

After a study of a strain of South African tick-bite-fever rickettsiae, WEYER (p. 1052) concludes that it differs from *R. conori*. He suggests that the rickettsiae of the tick-borne typhus group should be classified as varieties

of *R. rickettsi*. PRICE (p. 44) has made a study of the virulence of *R. rickettsi*. Strains of low and high virulence were found to be much the same in relation to the minimum number required to infect guineapigs and kill chick embryos, to the production of toxins and haemolysins when grown in chick embryos, to rate of multiplication, to distribution in the organs of inoculated guineapigs, to production of complement-fixing and neutralizing antibodies, and to their enzyme systems. Although when very large numbers of the less virulent strains were injected they produced the same effects as the virulent strains in 15 per cent. of guineapigs, there were no deaths, and the ultimate concentration of rickettsiae in the heart and brain was much less than with the virulent strains.

GOULD and MIESSE (p. 906) report the first definitely confirmed isolation of a strain of *R. rickettsi* from a naturally infected wild animal (*Microtus pennsylvanicus*) in the United States.

AIKAWA and HARRELL (p. 563 bis) report a study of fluid and electrolyte changes in rabbits and guineapigs infected with Rocky Mountain spotted fever.

In a survey of part of Mexico positive complement-fixation tests to *R. rickettsi* were found in 14-18 per cent. of people examined. SILVA-GOYTIA *et al.* (p. 257) show that the distribution of positive tests corresponded with the reported incidence of the disease, but indicated that most of the cases had been inapparent, abortive or ambulatory.

Q Fever

A monograph on Q fever has been issued by the World Health Organization (p. 367); it contains papers on many aspects of the subject, contributed by well-known authorities, including BABUDIERI, who (p. 367), has written separately, in the same strain, on epidemiology, diagnosis and prophylaxis.

Experimental studies by COMBIESCU *et al.* (p. 1236) on Q fever show that respiratory infection is important and that *R. burneti* can persist alive in the excretions (especially when dried) of reservoir animals and vectors. Infected milk may remain infective for at least 45 days, but if allowed to become sour it ceases to be infective in 24 hours—infestation has often been traced to the drinking of unboiled fresh milk. The rickettsiae can pass through the placenta, and through the skin, of experimental animals. *Rhipicephalus sanguineus* can transmit the infection by bite, and other arthropods have been found infected in nature. Yolk-sac cultures of *R. burneti* remained infective up to 330 days at 4°C.; in similar conditions *R. prowazekii*, *R. mooseri* and *R. conori* had much shorter survival periods.

Experiments in which dogs were fed with yolk sacs infected with *R. burneti* indicated that they continued to excrete the organism in the faeces up to 6 days and could therefore spread the disease for that length of time. RAVAIOLI, however (p. 369), could not otherwise determine their importance in the transmission of the disease. The importance of domestic animals, and especially sheep, in the spread of Q fever has been stressed by several observers. WINN *et al.* (p. 47), for instance, found that the faeces of two sheep were heavily infected with *R. burneti* at lambing and for a few days afterwards. They did not think that the faeces were contaminated by the highly infective placentas, but that the organisms were already in the faeces when these were passed. In an investigation of Q fever in England MARMION *et al.* (p. 907) examined the serological reactions of persons in Kent with a history of pneumonia or unexplained fever. In this area there are many sheep. A number of persons gave positive results and a history of illness at about the lambing season, and many of the sheep were positive. There is therefore some evidence that infection of sheep was

responsible for the disease in man. An explosive outbreak of 200 cases of Q fever in an Italian town of 4,200 people is described by BABUDIERI and PAOLUCCI (p. 1053). The infection was traced to a flock of sheep brought each night to a courtyard in the built-up area, and was probably conveyed by blown dust. There was no evidence of man-to-man spread.

In 1947-48 Q fever occurred in numerous outbreaks in Württemberg-Hohenzollern, but since then has been less common. GERMER and GLOKNER (p. 257) show that complement-fixation tests on persons who had the disease several years ago tend to remain positive if the attack was severe. Positive results were also found in cattle and sheep.

Q fever is widespread in Turkey, and affects man, sheep, cattle, goats and buffaloes. PAYZIN (p. 165) summarizes reports on the disease and shows that the many strains of *R. burnetii* isolated by him do not differ from strains from other countries. He discusses symptoms and treatment.

Complement-fixation tests indicate that Q fever is enzootic in Tunisia; the number of positive results in goats, sheep, cattle and man was not large (MAURIN, p. 564). Complement-fixation tests performed in Cairo, Aswan and villages of Egypt have shown that the disease is widespread, and TAYLOR *et al.* (p. 908) found a high incidence in very young children and in females; this is at variance with experience in the United States and may reflect close association with domestic animals. *R. burnetii* has been isolated for the first time in Egypt, from *Hyalomma dromedarii* from camels and from *H. excavatum* from Sudanese bulls (TAYLOR *et al.*, p. 788). The collections were made at the Cairo abattoir. CARLEY and POPE (p. 564) isolated 2 strains of *R. burnetii* from *Ixodes holocyclus* in Queensland. This is the tick which most commonly attacks man there, and this is the first time it has been found naturally infected.

DERRICK *et al.* (p. 45) review the history of fever in the Mackay District of Queensland, where recent serological tests have revealed scrub typhus, murine typhus, Q fever and leptospirosis (*pomona*). Occasional cases are negative to all these tests but clinically resemble scrub typhus and give complement-fixation tests up to 1 in 16 with rickettsialpox antigen. In comment Megaw suggests that they may be cases of tick typhus, which is antigenically related to rickettsialpox. STOKES (p. 368) reports Q fever in workers in South Australia, all of whom were connected with abattoirs or with cattle, or were laboratory workers cultivating the organism. Surveys of cattle were negative but the human infections probably originated from small isolated foci of diseased cattle.

There is no evidence that Q fever exists in New Zealand, and the importation of one goat from England with that infection, detected during quarantine, has led to the decision that certificates of freedom from serological evidence of infection should be submitted before animals are shipped (SALISBURY, p. 46).

R. burnetii was isolated from the amniotic or allantoic fluids of sheep in an area of North Carolina where Q fever is endemic; placental tissues were also positive (ABINANTI *et al.*, p. 369).

The technique of fluorescence microscopy can be applied to the study of *R. burnetii* (URBACH and SPRÖSSIG, p. 908).

R. burnetii is exceptionally resistant to disinfectants—for instance to free chlorine at 100 mgm. per litre, to phenol at 1 or 2 per cent., and to hydrogen peroxide in 5 times the dose used for disinfecting milk. MUSCOVICI (p. 47) points out that if rabies vaccine is prepared from sheep spinal cord treated in the usual way with 0.5 per cent. phenol there is a risk of causing Q fever if the sheep was infected. The usual strength of sodium merthiolate (1 in 10,000) would be quite inadequate.

Several studies have been made on the serological reactions in Q fever. STOKER (p. 47) has observed that passage of *R. burnetti* through eggs tends to enhance complement-fixation activity. The main interest in the findings lies in the ability of the rickettsial antigen to combine with antibody without fixing complement, this feature is important in connexion with the preparation of antigen for complement-fixation tests from some freshly isolated strains. PATOČKA and KUBELKA (p. 482) use yolk sacs infected with *R. burnetti*, frozen and twice extracted with ether, for the complement-fixation test. In Czechoslovakia they obtained positive results in suspected patients, laboratory workers and sheep. In a study of complement fixation in Q fever and the relationship between the antigen and antisera, TAKANO and KITAOKA (p. 565) found that although the Nine Mile and the Henzerling antigens were equally sensitive in the agglutination reaction, the former was more sensitive in the complement-fixation reaction. Although a few non-specific reactions were given to the complement-fixation test for Q fever in cattle, URBACH (p. 789) found that the test was highly specific in man. In anti-complementary sera treatment with kaolin largely eliminates the disturbing effects.

LUOTO (p. 166) has devised a capillary agglutination test for Q fever in cattle, and in a large number of comparative tests he has found it more sensitive than the complement-fixation test, and less likely to give non-specific responses. The test becomes positive soon after infection and remains so for a considerable time after the complement-fixation test has become negative.

Late tests in 14 persons who had had Q fever a year previously showed that the Giroud intradermal test was positive in all whereas the rickettsia-agglutination and complement-fixation tests were positive in 7 and 4 only (GIROUD *et al.*, p. 368).

A study of Q fever in guineapigs is reported by GERMER (p. 1053), who notes that the one pronounced difference between this and other rickettsial fevers is the absence of generalized vasculitis and perivasculitis in Q fever. On certain grounds (filter-passing and resistance to heat and chemicals) he thinks that the organism should be transferred to a new genus, *Coxiella*.

In an outbreak of Q fever in Czechoslovakia the chief symptoms were rigors, headache, pain in the chest, anorexia and insomnia, and the disease lasted 4-10 days. KUBÁSEK (p. 1154) thinks that it may have originated from an epizootic of broncho-pneumonia in lambs earlier in the year.

GERMER and SCHAUBER (p. 48) report chronic lymphocytic meningitis in a patient 10 days after the onset of Q fever. Rickettsiae were isolated from the cerebrospinal fluid. Infection was traced to a flock of sheep.

Rickettsialpox

Continuing his studies of rickettsialpox, FULLER (p. 787) has traced the life cycle of the vector, *Allodermanyssus sanguineus* from egg to adult, a course of development which takes 17-23 days.

Trench fever

A case is described by HOENIG and MOHR (p. 1054) in which by the louse-feeding test rickettsiae of trench fever were recovered from a patient 10 years after the presumably original attack and 3½ years after he had left the region where re-infection was possible. After treatment with aureomycin several later tests were negative.

Small laboratory animals are not susceptible to infection by *R. quintana*, attempts at culture have always failed, and the only susceptible arthropod

is the human louse. MOOSER and WEYER (p. 49) have now succeeded in infecting rhesus monkeys by intravenous injections of suspensions of infected louse intestine. Rickettsaemia persisted for 10-82 days and lice could be infected by feeding; the monkeys showed only slight signs of illness.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control; Animal malaria—monkeys, other animals, birds.

D'ALESSANDRO, G. Studio di un habitat montano dell' *A. labranchiae* in Sicilia. [Study of a Mountain Habitat of *Anopheles maculipennis labranchiae* in Sicily] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 361-72, 1 graph & 7 figs. English summary.

The following is taken largely from the author's English summary:—

The author describes a mountain habitat of *A. labranchiae* (Mount Sori and its slopes, 1270-1847 metres of altitude, Nebrodi Mountains, Messina Province), thus confirming the earlier findings on the outdoor habits of this species in that zone.

The zone under study shows the presence of a dense, pure population of *A. labranchiae* and the observations lead to the belief that this species, in the above-mentioned habitat, may possibly live under natural conditions independent of those created by man.

These findings, which agree with those from Sardinia, contribute to our knowledge on the biology of this species.

The domestic and anthropophilic characters attributed to *A. labranchiae*, are . . . a secondary adaptation. . . . However, this species has never lost its original capacity of living a wild life. This condition is more evident at present as a consequence of the destruction, by insecticides, of that portion of the mosquito adult population which finds shelter in dwellings.

MARIANI, M. & CEFALU, M. Sul modo di svernare dell'*Anopheles labranchiae* in Sicilia in condizioni di vita extra-domestica. [The Method of Hibernation of *Anopheles m. labranchiae* in Sicily in Extra-Domiciliary Conditions] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 485-8. [10 refs.] English summary (7 lines).

The following is the authors' English summary:—

“Through the systematic study of an *A. labranchiae* area, the authors confirm that this species, in its wild habitat and far from human influence, slows down its activity at the onset of winter.

“In Sicily, in fact, narrow shelters (small slits and holes in the rocks) were found inhabited, during the months of January and February, by adult females of *A. labranchiae* which showed blood in their gut and ovaries at various stages of development, i.e. up to the fifth stage (mature ovaries).”

BAGIROV, G. A. [The Common Malaria Mosquito, *Anopheles maculipennis* Meigen, in Bird Colonies in the Astrakhan State Reserve] *Dokl. Akad. Nauk SSSR* (n.s.). Moscow. 1953, v. 89, No. 2, 381-4. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1955, Apr., v. 43, Pt. 4, 51.]

Details are given of the finding in the summers of 1951 and 1952 of *Anopheles maculipennis messeae* Flni. in large numbers in the nests of various birds (chiefly large colonial-nesting species) in a nature reserve in the Province of Astrakhan. Some of the females were shown to contain avian blood, but they were evidently using the nests as resting places by day as well as feeding places; they were particularly numerous in nests that had fallen from trees to the ground and in those that, owing to their structure or position, afforded most shelter from wind. Other mosquitos were abundant in the area, but were very seldom found in the nests.

MICKS, D. W. *Vorticella Infestation of Anopheles atroparvus Larvae*. *J. Econom. Entom.* 1955, Apr., v. 48, No. 2, 215-16, 1 fig.

In 1950 the author reported the lethal effect of the peritrichous ciliate *Vorticella microstoma* on *Anopheles quadrimaculatus* larvae [this *Bulletin*, 1951, v. 48, 113]. No such effect could be produced in culicine larvae (*Aedes aegypti* and *Culex fatigans*).

He now reports a similar observation with *Anopheles maculipennis atroparvus* under laboratory conditions in Pavia, Italy. Many generations were reared without incident, but, during the month of April, dead and dying fourth stage larvae of *A. m. atroparvus* were found in many rearing pans. Large numbers of *Vorticella* sp. were found attached to the integument. A new finding was that in larvae infested with *Vorticella* which survived long enough to pupate, pupation was nearly always incomplete: the head capsule of the larva remained attached to the pupa (this is illustrated). The pupae lived as long as 24 hours in this condition. It is not known whether this was an effect of the ciliates.

Although the colony of *A. m. atroparvus* was kept in the same room as colonies of *Culex molestus* and *C. fatigans*, the ciliates could not be established in pans of these culicines.

The results are in accord with the author's earlier work, but not with that of JETTMAR [this *Bulletin*, 1948, v. 45, 274] who found *Vorticella* infestation of *C. fatigans*. It is pointed out, however, that in Jettmar's observation, the *Vorticella* infestation was secondary to a heavy invasion by streptobacilli.

H. J. O'D. Burke-Gaffney

CEFALÙ, M. & TERMINELLO, L. L'*Anopheles algeriensis* Theobald in Sicilia. [*Anopheles algeriensis* in Sicily] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 323-30, 2 figs. [18 refs.] English summary (8 lines).

The authors record the capture of *Anopheles algeriensis* in Sicily on 12 occasions since 1952. Brief data are given and distinctive morphological characters of adults and larvae are described. It is believed that these records are due to more intensive *Anopheles* surveys during recent years.

H. S. Lceson

SEN, P. **Ecology of Anopheline Mosquitoes.** *Proc. 42nd Indian Sci. Congress.* Baroda. 1954, Pt. 2, 20 pp., 1 fig. [66 refs.]

The author, as President of the Section of Zoology and Entomology of the Indian Science Congress in 1954, chose for his Presidential Address

the *Ecology of Anopheline Mosquitoes*, a subject on which he has made numerous contributions for a considerable number of years. He presents a useful account, limiting himself to work done in India and giving emphasis particularly to more recent publications. The paper is essentially a summary and for that reason incapable of being abstracted here: sufficient for us to direct attention to it and to commend it.

P. A. Buxton

RATTAN LAL. **Notes on the Effect of Temperature on the Developmental Stages of *Anopheles subpictus* Grassi and *Anopheles stephensi* Liston.** *Indian J. Entom.* 1953, June, v. 15, Pt. 2, 97-106. [27 refs.]

This paper presents the results of work carried out at Lahore, in 1940-42. The insect developmental equation of PRADHAN (*Proc. Nat. Inst. Sci. India*, 1946, v. 12, 301; 384) has been applied to the data obtained. Thermal-death points of all stages of both species were determined for 5-minute and 1-hour exposures. The optimum temperature range for the development of *A. subpictus* was 30°-35°C.; and for *A. stephensi* 25°-34°C. These findings are correlated with field observations on the two species.

D. M. Minter

KRISHNAMURTHY, B. S. **Malaria Vectors of India. VI. *Anopheles leucosphyrus* Denitz, 1901.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1955, Jan., v. 3, No. 1, 1-8, 1 map. [36 refs.]

Anopheles leucosphyrus is a species complex containing *A. leucosphyrus leucosphyrus*, the varieties *elegans*, *hackeri*, *balabacensis*, *riparis*, *puputensis* and the species *cristatus*. In its different forms it occurs in the Oriental region from India to Celebes and from Java to Formosa.

The author gives the geographical distribution in India (with map) and an account of its bionomics. It is an important vector of malaria in Assam and in Borneo but wherever it has been dissected in adequate numbers it has been found to be infected.

Control must be suited to local circumstances; naturalistic methods, herbicides and insecticides (DDT and BHC) are all being tried.

H. S. Leeson

VENKAT RAO, V. **Malaria Vectors of India. VII. *A. varuna* Iyengar, 1924.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1955, Jan., v. 3, No. 1, 9-23, 1 map. [35 refs.]

Anopheles varuna is one of three species (the others being *A. fluviatilis* and *A. minimus*) which used to be known as the "funestus group" owing to their close resemblance to *A. funestus* of Africa.

A. varuna is a malaria vector of some importance in the hill tracts of East Central India and less so in Bengal. The distribution of the species in India is given and shown on a map; the species also occurs in Burma and Ceylon.

Breeding places and adult haunts are described and notes are given on other aspects of bionomics and the possible existence of biological races is discussed.

For control of this anopheline antilarval measures are ruled out as being too expensive. Spraying inside houses with DDT kerosene solution is effective for 2 to 6 months. It is thought, however, that annual spraying with water-dispersible powder would probably be even more effective and economical.

H. S. Leeson

KIKUTH, W. Moderne Malariatherapie und -prophylaxe. [Modern Treatment and Prophylaxis of Malaria] *Deut. med. Woch.* 1954, Sept. 17, v. 79, No. 38, 1401-3. [14 refs.]

This is a general paper, in which the author, who is well known for his distinguished researches into the chemotherapy of malaria, discusses the newer knowledge of the cycle of the malaria parasite, and refers to the now well-known drugs which are used so successfully in treatment and prophylaxis. In particular he gives an account of the action of Resochin [chloroquine] and of primaquine. The general thesis of the paper may be summed up in the words of his summary, to the effect that with these two drugs the problem of chemotherapy of malaria can now be regarded as solved.

Charles Wilcocks

v. TAPAVICZA, T. Malariatherapie mit Resochin in Lösung. [The Treatment of Malaria with Resochin (Chloroquine) in Solution] *Med. Klin.* 1954, Dec. 3, v. 49, No. 49, 1958, 1962-3.

The author writes from Ethiopia, from an experience of over a hundred cases of malaria in the indigenous people and in Europeans. He has used a 5 per cent. solution of Resochin [chloroquine] of which 5 cc. contain 0.25 gm. of the drug. [This dosage is given in terms of the salt, not of the base. The equivalent would be 0.15 gm. of base.]

The injection is usually given by the intramuscular route, except in cases in which there is coma. In such cases it is given intravenously, but as a rule it has been found that a single intravenous injection is so effective that the second injection can be given intramuscularly. If any further treatment is needed, it can be given by mouth in the usual way.

The author gives an account of six severe cases treated in this manner, and ends with the remark that since he has begun to use Resochin in solution he has not lost a single patient.

It is evident from the paper that both *P. vivax* and *P. falciparum* malaria are endemic in the area.

Charles Wilcocks

RODHAIN, J. Contribution à l'étude de *Plasmodium schwetzi*, E. Brumpt. [Contribution to the Study of *Plasmodium schwetzi*, E. Brumpt] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 69-72, 1 fig. on pl.

This paper describes the first experimental infection of *Plasmodium schwetzi* in mosquitoes (*Anopheles maculipennis atroparvus*). Five cc. of citrated blood containing *P. schwetzi* and *P. reichenowi* from a chimpanzee recently arrived in Belgium from the Congo were inoculated into another chimpanzee (Suzanne II) whose blood contained no parasites. Seven days later, the latter showed rings of *P. schwetzi* in the blood, followed in a week by gametocytes. Mosquitoes were then fed on the animal on various days, but no batches became infected until the eighteenth day of parasitaemia, from which feeding 66 per cent. of the mosquitoes developed oöcysts. The oöcysts took 12 or 13 days to mature and sporozoites in rather small numbers appeared in the salivary glands two days later, remaining there for a week but then disappearing, perhaps because the insects were repeatedly fed. A third chimpanzee (Jules) was bitten by these infected mosquitoes, but the result of this experiment is not reported.

Perhaps the greatest interest of this paper relates to the size of the oöcyst

which, when mature, was found to measure 70-74 μ in diameter, being therefore, as Rodhain points out, considerably larger than the mature oöcyst of *P. vivax*, and thus affording the first morphological evidence of a specific difference between these two parasites. [It would be useful to know (1) if the measurement was made with no coverslip over the preparation: the weight of a coverslip often expands the size of oöcyst to a greater or less degree, and (2) the pattern of the pigment in the oöcyst: the presence of *P. reichenowi* lurking in the background suggests that the infection in the mosquito might have resulted from undetected crescents in the blood of Suzanne II and not from *P. schwetzi*—the nature of the pigment would have verified this point.]

P. C. C. Garnham

RODHAIN, J. & DELLAERT, R. Contribution à l'étude de *Plasmodium schwetzi* E. Brumpt (2^{me} note). Transmission du *Plasmodium schwetzi* à l'homme. (Note préliminaire.) [Contribution to the Study of *Plasmodium schwetzi* E. Brumpt. (2nd Note.) Transmission of *Plasmodium schwetzi* to Man] Ann. Soc. Belge de Méd. Trop. 1955, Feb. 28, v. 35, No. 1, 73-6.

A chimpanzee was brought from Wamba, Belgian Congo, to Antwerp and in its blood was found *Plasmodium schwetzi*; a second chimpanzee (Suzanne II) was inoculated with this blood and a patent infection followed. On the seventh day of patency, 10 cc. of blood were removed and half was inoculated intravenously into an adult man and half into a boy 18 years old. Only the former developed an infection, which began with fever 57 days after the inoculation, accompanied by a slight parasitaemia and followed by only one other paroxysm 2 days later. A general paralytic was inoculated intravenously with the blood of this man, and this time fever began in 6 days and 11 paroxysms occurred. The density of parasites in the blood was comparatively low. A second human passage of *P. schwetzi* was then performed, which gave rise to an infection of moderate intensity, with 6 paroxysms of fever. The patients are still being watched by the authors, and further observations on this strain will be made. P. C. C. Garnham

DURAND, P. & MATHIS, M. Sensibilité de trois rongeurs sauvages tunisiens. *Mus musculus spretus*, *Dipodillus campestris* et *Meriones shawi* au *Plasmodium berghei* Vincke et Lips 1948. [Susceptibility of Three Wild Rodents of Tunis, *Mus musculus spretus*, *Dipodillus campestris* and *Meriones shawi*, to *Plasmodium berghei* Vincke and Lips 1948] Arch. Inst. Pasteur de Tunis. 1955, Jan., v. 32, No. 1, 17-24.

Three more rodents are now shown to be susceptible to infection with *Plasmodium berghei* (Keyberg 173 strain). The mouse, *Mus musculus spretus*, contracts a severe disease ending fatally. The gerbil, *Dipodillus campestris*, usually exhibits a light infection, but if given a heavy inoculum, may develop an intense parasitaemia which will kill the animal; survivors of the acute attack continue to show parasites for as long as five months. The merion, *Meriones shawi*, can now be bred in the laboratory, and if very young animals (4 or 5 days old) are inoculated with *P. berghei* they will die in a few days, of an overwhelming infection. Merions a month old are much less susceptible and adult animals show only a sub-microscopic infection, detectable by subinoculations into mice up to the thirtieth day. Repeated passage of the parasite through 14 merions failed to exalt its virulence for this animal. P. C. C. Garnham

ROLLO, I. M. **The Mode of Action of Sulphonamides, Proguanil and Pyrimethamine on *Plasmodium gallinaceum*.** *Brit. J. Pharmacol. & Chemotherapy.* 1955, June, v. 10, No. 2, 208-14, 2 figs. [27 refs.]

The author has reviewed some of the literature concerned with cross-resistance, potentiation and antagonism between certain antimalarial drugs, in an attempt to clarify the mechanisms involved. Infections with *P. gallinaceum* were produced in chicks up to 12 days old by intravenous inoculation with parasitized blood. Drugs were given *per os* in solution or suspension, starting shortly after inoculation, to a total of 7 doses within 3½ days. The infection was followed in stained blood films. The dose which reduced parasitaemia to 50 per cent. of that in controls was termed the ED50. The following is the author's summary:—

" 1. A strain of *P. gallinaceum* resistant to both proguanil and pyrimethamine retained its sensitivity to sulphadiazine.

" 2. *P. gallinaceum* treated with proguanil quickly became resistant to that drug and slightly resistant to pyrimethamine. Identical treatment with pyrimethamine failed to induce resistance either to pyrimethamine or to proguanil.

" 3. Sulphadiazine strongly potentiated the action of pyrimethamine. There was no potentiation between proguanil and pyrimethamine.

" 4. The action of both sulphadiazine and pyrimethamine was competitively antagonized by folic acid.

" 5. A possible mechanism of action depicting the inter-relationship of sulphadiazine, proguanil and pyrimethamine is put forward. Proguanil and pyrimethamine may have a twofold mode of action involving, firstly, an acceptor mechanism whereby the drugs are made available to interfere with the metabolic reaction and, secondly, a "lethal" point of action within the metabolic pathway—probably by interfering with the conversion of folic to folinic acid."

J. D. Fulton

TRYpanosomiasis

In this section abstracts are arranged as far as possible in the following order:—African—human, animal; American—Chagas's disease and other trypanosome infections. In each form the following order is followed:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

WEST AFRICAN INSTITUTE FOR TRYpanosomiasis RESEARCH. **Annual Report 1954** [NASH, T. A. M., Acting Director]. 36 pp. 1955.

Dr. T. A. M. Nash, writing as Acting Director (but recently appointed as Director), presents a report in which he makes an attempt to explain current research to the layman. The information bureau or museum makes an attempt to do the same thing by maps, diagrams or photographs. The report shows that this exhibit has been visited by a number of men of distinction and by Native Administration officials, members of both the Police College and army and parties of schoolchildren.

Selecting a few points from the numerous ones referred to, one notices that four strains of *Trypanosoma gambiense* are maintained. It seems

that their virulence to rodents is higher than it was at first and they are now maintained by direct transmission and consistently show heavy infections in adult rats and mice without any necessity to pass them through nursing rats. The strains, isolated from human patients in different parts of Nigeria, differed at first to a great extent in their virulence to rodents and continue to do so. An attempt has been made to establish a satisfactory *routine* cyclical transmission through *G. palpalis* but this is at present irregular. The conditions provided for the flies must be good, for about 50 per cent. of them survive one month and 20 per cent. over two months: at the conclusion of an experiment infection rates in salivary glands in surviving flies average about 6 per cent., a satisfactory figure.

A considerable amount of work is in hand on the pathology of human trypanosomiasis, particularly in relation to changes in the blood proteins, to which are related studies on diagnostic methods and on the erythrocyte sedimentation rate.

It is noted with regret that two veterinary research officers have left the staff so that research on animal trypanosomes has not advanced very far. The protozoologist can, however, report that one strain of *T. vivax* has become so well adapted in the rat that it has been maintained in these animals for over three years, with nearly 500 passages. The infectivity and virulence have not changed over the last 12 months and even now the strain is still easily and regularly transmitted cyclically by *G. palpalis* in spite of very numerous transmissions by syringe. Much work has been given to experiments on transmission of *T. congolense* by *G. palpalis* and *morsitans*. Infection rates of about 3 per cent. among surviving flies have been obtained in both species but the conditions necessary for successful conditions have not yet been established.

The entomologist reports on his investigations at the field station at Ugbobigha which must be close to the Gates of Paradise: eight species of tsetse are available in the vicinity.

P. A. Buxton

PINTO, A. R. da C. Relatório sobre o funcionamento da Missão de estudo e combate da doença do sono na Guiné Portuguesa, referente ao ano de 1952. [The Work of the Sleeping Sickness Mission in Portuguese Guinea in 1952] *Anais Inst. Med. Trop.* Lisbon. 1954, June, v. 11, No. 2, 441-75, 1 map.

EAST AFRICA HIGH COMMISSION. Notes for Field Studies of Tsetse Flies in East Africa. East African Tsetse and Trypanosomiasis Research and Reclamation Organization. 49 pp., 13 figs. 1955: Nairobi.

This valuable publication is intended to help field workers, particularly men who have to carry out skilled duties in relation to tsetse survey and so forth. It is clearly written and illustrated with excellent simple line drawings. It concentrates rather on matters of practice than of theory; for instance it tells the reader how to carry out survey for tsetse, classification of types of vegetation, dissection of tsetse, identification and a hundred other things. It will tend to standardize techniques, and terminology, and for that and other reasons has already proved very valuable.

[It might be suggested that the booklet would be more valuable if a little more attention had been given to editing. There is no title page; the date of publication might be discovered from the date of writing of the preface, and one might also dig out the fact that this is a third

edition. Some readers might be glad to know the significance of the letters E.A.T.T.R.R.O.]

P. A. Buxton

HEWITT, R. I., GUMBLE, A. R., WALLACE, W. S. & WILLIAMS, J. H. **Experimental Chemotherapy of Trypanosomiasis. V. Effects of Puromycin Analogues against *Trypanosoma equiperdum* in Mice. Antibiotics & Chemotherapy.** New York. 1955, Mar., v. 5, No. 3, 139-44. [32 refs.]

Puromycin, an antibiotic of which the chemical structure is now known, is of interest because of its activity against a wide variety of living things: these include certain bacteria, protozoa, tumours and helminths. This paper records tests of the therapeutic action of 52 analogues of puromycin against *T. equiperdum* infection in mice: none of those newly synthesized was found to be more active than the amino nucleoside analogue previously found to possess greater activity than puromycin itself. There is some discussion of the possible mode of action of these substances. They presumably affect a metabolic process common to a variety of living creatures: that the process is the same is confirmed by the fact that among these analogues anti-tumour and anti-trypanosome activity vary together. The reversibility of their effects by certain substituted purines suggests that they act by interfering with the synthesis of nucleic acid or nucleoproteins.

L. P. Garrod

SANJURJO, D., HACK, W. H. & ROMAÑA, A. Contribución al estudio de la endemia chagásica en la provincia Presidente Perón. [Study of the Endemicity of Chagas's Disease in the President Perón Province, Argentina] *An. Inst. Med. Regional.* Tucuman. 1954, Dec., v. 4, No. 1, 19-26. [10 refs.] French summary.

The following is a translation of the authors' summary in French:—

The authors present the results of an epidemiological study carried out in the area of Resistencia, capital of the President Perón Province, with a view to determining the incidence of endemic Chagas's disease which present data (parasitic index of domiciliary triatomids, number of confirmed cases, etc.) show to be spread throughout the Province.

For reasons unrelated to the aim of this work, the authors could use only xenodiagnosis as the diagnostic method, limiting it to the examination of children and adolescents. In these conditions, they found 29 positive results among 275 children of both sexes aged 2 to 16 years and apparently healthy. At least 10.54 per cent. therefore harboured the parasites, including the very young children.

H. J. O'D. Burke-Gaffney

ROMAÑA, C. Panorama epidemiológico de la enfermedad de Chagas en la Argentina a través de investigaciones sistemáticas. [Epidemiological Picture of Chagas's Disease in Argentina arising from Systematic Studies] *An. Inst. Med. Regional.* Tucuman. 1954, Dec., v. 4, No. 1, 27-33. French summary.

The following is a translation of the author's summary in French:—

The author shows that in Argentina Chagas's disease spreads in general from the northern frontier to the 40th parallel, and this area coincides with the geographical distribution of *Triatoma infestans*, the sole vector of the disease in man in Argentina.

He then studies the statistical data of various other authors, from which emerges the finding that 20 per cent. of the population at risk in contact with the triatomid bugs are infected.

He calculates that of the 3,500,000 inhabitants of countries who live in regions infested by triatomids, there are at least 700,000 carriers of *Trypanosoma cruzi*.

H. J. O'D. Burke-Gaffney

HERRER, A., LENT, H. & WYGODZINSKY, P. Contribución al conocimiento del género *Belminius* Stal, 1859 (Triatominae, Reduviidae, Hemiptera).

[**Observations on the Genus Belminius (Triatominae)**] *An. Inst. Med. Regional*. Tucuman. 1954, Dec., v. 4, No. 1, 85-105, 48 figs. English summary.

DALMA, J. Nota sobre el líquido cefalorraquídeo en la enfermedad de Chagas. [**Note on the Cerebrospinal Fluid in Chagas's Disease**] *An. Inst. Med. Regional*. Tucuman. 1954, Dec., v. 4, No. 1, 47-55. [20 refs.] French summary (9 lines).

The following is a translation of the author's summary in French:—

In 12 cases of Chagas's disease without neurological manifestations, in which the cerebrospinal fluid was examined, no alterations were found in the albumin or globulin levels, in the number of cells, or the amount of glucose and chlorides. Nevertheless, in 4 cases a positive complement-fixation reaction was obtained with antigens made from cultures of *Trypanosoma cruzi* (Davies-Romaña-Gil method).

The author discusses the general biological significance of this result and the need for elucidating further its origin and mechanism.

H. J. O'D. Burke-Gaffney

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

CALERO, C. & TAPIA, A. Dermatosis post-Leishmaniasis americana.

[**Dermatitis following American Leishmaniasis**] *Archivos Med. Panamericanos*. 1954, Oct.-Nov.-Dec., v. 3, No. 4, 242-8, 12 figs.

The following is a translation of the author's summary:—

The authors describe a case of verrucous dermatitis which began 3 months after cure of a typical leishmanial ulcer, with the first localization in the neighbourhood of the original scar and secondary lesions on both right limbs, the right side of the chest and the lobe of the left ear.

Biopsy failed to show typical leishmanial changes, but the Montenegro test was positive; the clinical features resembled the forms seen in post-kala-azar dermal leishmaniasis; and treatment with 1 per cent. solution of tartar emetic cleared the patient of the verrucous dermatitis.

H. J. O'D. Burke-Gaffney

JAFFÉ, L. **Nasal Leishmaniasis americana in Panama.** Reprinted, with additions, from *Arch. Otolaryngology*. 1954, Nov., v. 60, 601-11, 4 figs. [18 refs.]

A general account of mucocutaneous leishmaniasis, with special emphasis on the otolaryngologist's point of view, is given; this is summarized by the author as follows: "American leishmaniasis occurs from Mexico to the Argentine. Lesions of the mucosa, especially of the nose, are more frequent in the southern countries of the New World than further north. They may lead to extensive destruction of the upper respiratory tract, and even endanger life. Occasionally the condition has been found also in the temperate zone in persons who have resided in endemic regions. Only one case of affection of the nasal mucosa has been reported in the past from Panama."

He also emphasizes the difficulties of histological diagnosis; he states that in formalin-fixed preparations it is not possible to find *Leishmania*, and that a diagnosis of tuberculosis is often erroneously made.

He reports 8 cases from Panama, in which he considers that the diagnosis was certainly muco-cutaneous leishmaniasis. All the patients displayed lesions of the nasal mucosa. All but 2 had strongly positive Montenegro intradermal tests; in 1 case this test was not done and in the other it was moderately positive. All but 1 responded to antimony treatment and on this the diagnosis usually rested, because in no case was *Leishmania* found.

The antimony treatment given was stibophen (Fuadin, Repodral); the course recommended is 3.5 ml. followed by 5.0 ml., repeatedly on alternate days up to a total of 10 injections, the whole course being repeated after an interval of a month or more, if necessary. In 3 of the cases reported, 37 ml., 58.5 ml., and 72 ml. were the amounts given, another patient was given "one course", but in the remainder no amounts are stated.

L. E. Napier

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

SCHAEFER, G. L., FRIEDMAN, M. & LEWIS, Christeen. **The Incidence of Epidemic Typhus Antibodies in Individuals born in Eastern Europe.** *Ann. Intern. Med.* 1955, May, v. 42, No. 5, 979-82. [20 refs.]

"1. In a group of 100 individuals born in Eastern Europe between the ages of 50 and 76 without symptoms or signs of typhus, 22 (22%) possessed antibodies of epidemic typhus. In a group of 60 individuals within the same age group born in the United States or Canada, not one possessed demonstrable antibodies.

"2. The high percentage of individuals possessing these antibodies should alert the physician to the large number of people who may develop Brill's disease, and suggests the possibility of a human reservoir for the rickettsia.

"3. Caution should be used in diagnosing an active typhus infection in a person born in Eastern Europe unless a changing antibody titer is demonstrable."

Fox, J. P., JORDAN, Martha E., CONWELL, D. P. & ROBINSON, T. A. **Immunization of Man against Epidemic Typhus by Infection with Avirulent *Rickettsia prowazeki* (Strain E). II. The Sero-Immune State and Resistance to Virulent Challenge Two Years after Immunization and a Note as to the Nature of Immediate Postvaccination Reactions.** *Amer. J. Hyg.* 1955, Mar., v. 61, No. 2, 174-82. [10 refs.]

A description is given of the immunity state of 44 prisoner volunteers who had been vaccinated 2 years previously with the living avirulent strain E of *Rickettsia prowazeki* isolated by CLAVERO and PÉREZ GALLARDO in 1943 [see this *Bulletin*, 1944, v. 41, 24]. The original vaccination of these and 84 other volunteers, and the results of challenge of some of the other volunteers at intervals of 3-12 months after vaccination, have been described by Fox *et al.* [see this *Bulletin*, 1954, v. 51, 562]. The complement-fixing and mouse toxin-neutralizing antibody titres of the sera of the vaccinated persons showed a pronounced downward trend during the first 12 months but only a slight further decline in the second 12 months, and both of the antibody titres were higher and more persistent among those who had received larger doses than among those who had received smaller doses.

Among the 18 vaccinated persons previously challenged by inoculation with virulent *R. prowazeki* 3-12 months after vaccination only 1 gave a mild febrile reaction.

In the present experiments 5 men, immunized with strain E 24 months previously, were challenged with a virulent strain and none of them developed clinical symptoms although at the time of challenge 2 of them gave negative reactions with the complement-fixation test, 2 reacted at a titre of 1 in 2 and the remaining one reacted at 1 in 32. It appeared therefore that the disappearance of the complement-fixing antibodies did not necessarily show a loss of immunity.

Of 3 persons who had been immunized 9 months previously with Cox-type vaccine and were challenged with virulent *R. prowazeki* 2 developed clinical typhus, the 3rd gave no reaction. All 3 developed a rising-titre response to the complement-fixation reaction after challenge, the reaction having been negative at the time of challenge.

Attempts were made, without success, to separate from the vaccine by differential centrifugation the factor responsible for immediate post-vaccination reactions which occurred even among the immune persons.

John W. D. Megaw

Fox, J. P., MONTOYA, J. A., JORDAN, Martha E. & ESPINOSA M., M. **Immunization of Man against Epidemic Typhus by Infection with Avirulent *Rickettsia prowazeki* (Strain E). III. The Serologic Response and Occurrence of Post-Vaccination Reactions in Groups vaccinated under Field Conditions in Peru.** *Amer. J. Hyg.* 1955, Mar., v. 61, No. 2, 183-96.

The authors describe some of the results observed in a large-scale field trial of the avirulent strain E of *Rickettsia prowazeki* which is referred to in the preceding abstract. The trial is being conducted in high-altitude regions of Peru where louse-borne typhus is endemic. The vaccine consists of lyophilized yolk-sac material prepared by Dr. Herald R. Cox at the Lederle Laboratories. The results described in the present paper relate specially to a population of about 2,200 civilians and 900 soldiers in an easily accessible area.

At an early stage of the investigation it was found that the largest of the doses under trial produced excessive reactions, that intradermal injections were not suitable for mass use and that intramuscular injections gave slightly better immunity responses than subcutaneous, besides being less likely to cause severe local reactions.

The immunizing antibody responses of the vaccinated persons 6 weeks after vaccination, as indicated by positive complement-fixation reactions, were as follows:—with doses of 0.25 ml. of 1.0 per cent. yolk-sac suspension, 97 per cent.; with the same doses of 0.25 per cent. suspension, 93 per cent.; and with doses of 0.1 per cent. suspension, 89 per cent. Some of the negative sera were found to have mouse toxin-neutralizing antibody and when these were added to the above figures the percentages of immunity responses were increased to 98, 96 and 95 respectively for the 3 doses. These results were obtained in non-immune persons; in persons who had positive fixation reactions at the time of vaccination the post-vaccination reactions after the smallest doses of vaccine showed higher titres in 90 per cent. of the cases, and in 68 per cent. the rise amounted to 4-fold or more, so it was concluded that these small doses provided an adequate "booster" effect.

The keeping quality of the vaccine appeared to be good; over a period of 8 months one lot remained sufficiently stable for practical purposes.

Formidable lists are given of the reactions observed; immediate reactions, 12–36 hours after vaccination, occurred equally among immune and non-immune persons; delayed reactions were absent or negligible among the immunes. With 1.0 per cent. yolk sac the chief immediate reactions were fever and headache in about 50 per cent.; about 2 per cent. were confined to bed for a day or two; with the smaller doses the reactions were usually trivial; they occurred in about 20 per cent. of the persons vaccinated.

The delayed reactions occurred 9–14 days after vaccination; fever and headache occurred in about 15 per cent. of the cases; in about 1.0 per cent. there was real illness, sometimes described by their physicians as "minor typhus". The reactions were much the same among the groups receiving different doses, but they were much more frequent and more severe among persons aged 30 and over than in younger persons.

The figures of the percentage of delayed reactions in different groups of persons show remarkable variations; for example in one group in which the concentration of vaccine was 0.1 per cent. the rate was 34 per cent., in another with the same dosage it was only 12 per cent.

A second phase of the field trials involves immunization of 10,000 persons with strain E and of a similar number with a "placebo" consisting of commercial Rocky Mountain spotted fever vaccine. *John W. D. Megaw*

See also p. 972, MORLAN, **Mammal Fleas of Santa Fe County, New Mexico.**

AUDY, J. R., THOMAS, H. M. & HARRISON, J. L. **A Collection of Trombiculid Mites from Manipur and Lower Burma, 1945–46.** Reprinted from *J. Zool. Soc. India.* 1953, June, v. 5, No. 1, 20–40, 4 figs. [19 refs.]

The following is essentially the authors' summary:—

Details are given of a collection of 40 species of Trombiculid mites from Manipur, and from Lower Burma, made in the year following April 1945 by the military Scrub Typhus Research Laboratory based at Imphal. A check list is given of 40 species of trombiculids from over 2,000 hosts. Infestation data are tabulated.

The scrub typhus vector, *Trombicula deliensis*, was found to be very widespread over the whole area of survey. It was abundant during the rainy season (July to December) but was replaced as the dominant mite by *Euschöngastia kohlsi* and *E. lanius* during the cool dry season.

The principal host of the vector in Manipur was *Rattus rattus bullocki*, which was very common in both houses; and in scrub. Bandicoots were common hosts in the Kabaw valley; in Lower Burma the principal hosts of the vector were *Bandicota bengalensis* and subspecies of *Rattus rattus* (e.g., *R.r. khyensis*).

The commoner species of mites, *T. deliensis*, *E. kohlsi*, *E. lanius*, *E. indica*, *Schöngastiella ligula* and *Walchia ewingi*, were differently distributed on the ground, while all but *E. indica* showed indications of a seasonal cycle of abundance. Reasons, based on ecological criteria, are presented to account for such seasonal variation in numbers.

D. M. Minter

BLANC, G. *Rickettsia (Coxiella) burnetii* (Derrick) au Maroc et accessoirement en Algérie et en Afrique équatoriale. Étude expérimentale. [*Rickettsia (Coxiella) burneti* (Derrick) in Morocco, also in Algeria and Equatorial Africa; An Experimental Study] Reprinted from *Rev. Belge Path. et Méd. Exper.* 1951, Sept., v. 21, No. 1, 17-36, 8 figs. [11 refs.]

In this paper, published in March 1951, the author describes the isolation of *Rickettsia burnetii* from various species of *Hyalomma* and *Rhipicephalus* ticks in Morocco. He states that the rickettsia must be widespread in Morocco and that it has also been isolated in Algeria and Equatorial Africa. Although he is convinced that infection must be widely diffused in all these countries Q fever is remarkably rare in man and no epidemic of the disease has been recorded in any of them. A description is given of Q fever experimentally produced in guineapigs, dogs, calves and other domestic animals. There is also a description of the disease produced in man for therapeutic purposes by intramuscular, intradermal and intranasal inoculation. This has already been described by BLANC *et al.* [see this *Bulletin*, 1948, v. 45, 892].

John W. D. Megaw

BLANC, G. & BRUNEAU, J. Entretien dans la nature de *Coxiella burnetii* par l'association du lapin de garenne *Oryctolagus cuniculus* (L) et de la tique *Hyalomma excavatum* C.L.K. [The Maintenance in Natural Conditions of *Coxiella* [*Rickettsia*] *burnetii* by the Association of the Wild Rabbit, *Oryctolagus cuniculus*, with the Tick, *Hyalomma excavatum*] Reprinted from *C.R. Acad. Sci.* 1953, v. 237, 582-4.

In a forest reserve 30 kilometres from Casablanca cattle-grazing is prohibited and there are large numbers of wild rabbits. Ticks of the species *Hyalomma excavatum* are very numerous, especially near the burrows of the rabbits. Nymph stages of these ticks, collected from the rabbits, were found infected with *Rickettsia burnetii* and it seemed very probable that the rabbits also must have been infected and so have acted as reservoirs of infection, though only in the limited sense of providing a source of infection for the few ticks which escaped infection through the ovum.

The only two wild mammals hitherto found naturally infected are said to be the bandicoot, *Isodon torosus*, in Australia and the merion, *Meriones shawi* in Morocco; now a third must be added to the list, the rabbit, *Oryctolagus cuniculus*.

In spite of the incredible abundance of infected ticks in the area it appears that they play no part in transmitting infection to man. Even though they sometimes bite they have no time to engorge themselves because this process needs at least 6 days, and even if they might transmit infection by the original act of biting they could not cause a disease of the clinical type of Q fever, which can be caused only by infection through the mucous membranes. Suspensions of infected ticks or of the spleen of infected guineapigs failed to cause Q fever in man by inoculations given for therapeutic purposes, but produced only a slight and short febrile reaction, without the pulmonary involvement which the author regards as an essential feature of clinical Q fever.

[The experiments on which the last statement is based were carried out in 1948 by the author and other workers (this *Bulletin*, 1948, v. 45, 892). In these experiments intramuscular inoculation of tick suspensions is said to have caused fever lasting several days, often of a two-phase type but with trivial general symptoms; rickettsiae could be isolated from the patients' blood and it is difficult to understand how these reactions can be referred to as not being attacks of Q fever.]

John W. D. Megaw

BLANC, G. & BRUNEAU, J. Ornithodores et Coxiellose (Q Fever). [*Ornithodoros Ticks and Q Fever*] Reprinted from *C.R. Acad. Sci.* 1955, v. 240, 129-31.

Although various species of *Ornithodoros* ticks have been found capable, in experimental conditions, of transmitting *Rickettsia burneti* from animal to animal by biting, only one species; *Otobius megnini*, parasitic on the ears of cattle, has hitherto been found naturally infected. In the forest referred to in the preceding paper the authors found *Ornithodoros erraticus* which was frequently infected with the spirochaete, *Spirochacta hispanica*; some of the local rabbits were infected with the same spirochaete.

In August 1954 the authors collected 20 of these ticks and allowed them to feed on a healthy guineapig; it gave no febrile reaction and its blood remained free from spirochaetes. After 15 days 10 of the ticks were triturated in saline and inoculated intraperitoneally into the same guineapig, which gave a febrile reaction on the 12th day, when it was sacrificed and was found to have an enlarged spleen weighing 2.30 gm. A suspension of this spleen was inoculated into another guineapig which developed Q fever; the diagnosis was confirmed by a cross-immunity test.

[In a footnote it is stated that an abstract in this *Bulletin* (1951, v. 49, 543) has been quoted as stating that JADIN had found *O. moubata* naturally infected with *R. burneti*. The statement actually was: "Ticks (*Ornithodoros moubata*) fed on experimentally infected guineapigs were found to harbour Q fever infection up to at least 4 months after feeding."]

John W. D. Megaw

ABINANTI, F. R., WELSH, H. H., WINN, J. F. & LENNETTE, E. H. **Q Fever Studies. XIX. Presence and Epidemiologic Significance of *Coxiella burnetii* in Sheep Wool.** *Amer. J. Hyg.* 1955, May, v. 61, No. 3, 362-70. [17 refs.]

The authors, working in South California, describe 7 cases of Q fever which occurred among persons who had specially close contact with wool. A survey was made of the incidence of complement-fixation reactions for Q fever among persons in the same region. Among 53 sheep shearers

22 (41.5 per cent.) had positive reactions at titres of 1 in 8 or over; among 1,465 members of the population in general there were 61 positive reactions (4.2 per cent.).

Coxiella (Rickettsia) burneti was recovered from tags of wool from the perineal region of 2 among 15 sheep examined 7 days after lambing; placental infection was demonstrated in both of these sheep and in 2 of the others.

John W. D. Megaw

ARMAND, M. & SENDRAL, R. Un cas clinique probable de Q fever observé au Maroc. [A Probable Clinical Case of Q Fever in Morocco] *Maroc. Méd.* 1954, Nov., v. 33, No. 354, 1026-7.

LELONG, M., SATGÉ, P., HABIB, E., SEBOUK, S. & WILLARD, J. J. Deux cas de maladie de Derryck et Burnet (Q Fever) chez l'enfant. [Two Cases of Q Fever in Children] *Bull. et Mém. Soc. Méd. Hôp. de Paris.* 1955, Nos. 13/14, 465-71.

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

TREJOS, A. & ROMERO, A. Prothrombin Levels in Yellow Fever. *Rev. Biología Trop.* San José, Costa Rica. 1954, July, v. 2, No. 1, 69-73, 1 chart.

The authors, from Costa Rica, have investigated the prothrombin level in 86 cases of yellow fever, of which 62 were non-fatal and 24 fatal. They observe that haemorrhagic manifestations constitute one of the most constant features of yellow fever, but they have found that there was no evidence of abnormal capillary fragility, that there was no constant change in coagulation and bleeding times, or in platelet counts or clot retraction studies, and that fibrinogen determinations were usually normal.

The findings in relation to plasma prothrombin, however, showed a definite relationship to the severity of the disease. In the 24 patients who died the average determination was 20.25 per cent., whereas in the patients who recovered the average prothrombin percentage was 66.7. Percentages below 25 were encountered only in cases with eventual fatal termination, with the exception of 1 in which the typical yellow fever virus was isolated, and in which the prothrombin rose subsequently to high levels.

The authors therefore suggest that in patients in whom the prothrombin level is below 25 per cent. on the fourth to the ninth day of illness, there is much less chance of recovery than in those in whom the percentages are above 35. In patients who recovered they have observed a rapid and in some cases early increase in prothrombin levels, which indicates rapid liver regeneration. This hepatic regeneration permits the metabolism of vitamin K, which was given to these patients in high dosage. The degree of diminution of the prothrombin level is proportionate to the severity of the liver lesion, and generally is related to the clinical findings.

Charles Wilcocks

THOMSON, W. O. **Encephalitis in Infants following Vaccination with 17 D Yellow Fever Virus: Report of a Further Case.** [Memoranda.] *Brit. Med. J.* 1955, July 16, 182-3.

The case described in this paper followed the inoculation of a seven-weeks-old baby boy on 24 July 1953 at the Immunization Clinic, Glasgow. On the 17th post-inoculation day the child was cross and feverish and remained in that state for the next 2 days, having no bowel or feeding disorders. He became increasingly drowsy, however, and on the 20th post-inoculation day his temperature was 102°F. (38.9°C.), his eyes began to roll and his limbs to twitch, he developed a frank convulsion and was admitted to hospital. Physical examination then showed, apart from exaggerated tendon reflexes, no other abnormality; shortly after admission, however, he had 3 further convulsive seizures. Blood examination revealed a leucocyte count of 13,000 per cmm. The cerebrospinal fluid was clear and not under increased pressure, contained protein 100 mgm. per cent. with an increase in globulin, had a cell count of 55 per cmm. (90 per cent. lymphocytes, 10 per cent. polymorphonuclears), and showed no acid-fast bacilli in film, no growth on culture. The Mantoux test was negative and a radiograph of the chest revealed no abnormality. Two days after admission the temperature returned to normal; thereafter the infant made a rapid recovery without antibiotic therapy and was discharged from hospital 16 days after admission. At a follow-up examination 3 weeks later the infant was found to be well, without any sequelae. In connexion with this case it has to be noted that 2 days before the onset of illness the child had been vaccinated against smallpox, but this was unsuccessful.

In his concluding paragraph the author observes that the exact cause of cases such as the one now described has yet to be ascertained. Whether such cases are, in fact, complications of 17D yellow-fever virus vaccination or are perhaps coincidental remains to be seen.

[Thirteen cases of encephalitis associated with the inoculation of infants with 17D virus vaccine have been reported since August 1952: 7 in France, 4 in the United Kingdom, 1 in Portugal and 1 in Nigeria.] *G. Stuart*

RABIES

REAGAN, R. L., CHANG, S. & BRUECKNER, A. L. **Studies by Electron Microscopy of a Fixed (Pasteur) Rabies Virus, a Street Rabies Virus and the Egg adapted Flury Strain of Rabies.** *Texas Reports on Biol. & Med.* 1955, v. 13, No. 2, 356-61, 3 figs.

"Studies by the electron microscope of brains of mice infected with strain R-174 Lederle street rabies virus, showed the virus to vary from 110 to 120 μ . In comparison, the study of brains of mice infected with the Pasteur N.I.H. Habel fixed-virus rabies strain measured 80 μ in diameter, and the Flury egg adapted rabies strain measured 110 μ in diameter. These bodies could not be demonstrated in concentrated normal mouse brain and normal chick embryo subjected to the same procedure of concentration and examination. The concentrated virus-bearing mouse street virus upon being injected into normal mice intracerebrally, produced rabies as did the fixed virus strain and the Flury strain which was injected into suckling mice intracerebrally. The concentrated material from normal mouse brains

and normal chick embryo injected intracerebrally into Swiss mice produced no evidence of rabies. Neutralization tests with the Flury and fixed virus rabies strains confirmed the virus in the material examined to be rabies virus, while mouse brains infected with the street virus showed numerous Negri bodies and confirmed this strain to be rabies."

CHABAUD, M. A., SÉRIÉ, C. & ANDRAL, L. Electrophorèse et diagnostic de la rage. [Electrophoresis and Diagnosis of Rabies] *Ann. Inst. Pasteur.* 1955, Apr., v. 88, No. 4, 420-34, 10 figs. & 1 chart.

The sera of animals with rabies have been examined by micro-electrophoresis on paper and compared with the sera of normal animals. Rabies induces modifications in the sera, especially apparent in the zone of globulins α_2 , which are markedly augmented. These characteristics are evident in specimens derived from the living or dead horse, ass, cow, cat and, particularly, dog. In dogs the electrophoretic test has never failed to give a positive diagnosis in cases where rabies has subsequently been detected by animal inoculation.

J. H. Birkinshaw

ANDO, K., ISHII, K., TOYAMA, Y., ICHIKAWA, Y., OKA, Y., IRISAWA, J., OTANI, S., ISHII, S. & KOBAYASHI, K. Studies on the Prophylactic Treatment of Rabies. *Japanese J. Med. Sci. & Biol.* 1954, Oct., v. 7, No. 5, 473-94, 3 figs. [29 refs.]

Ando and his co-workers have confirmed HABEL's [this *Bulletin*, 1946, v. 43, 192] and KOPROWSKI's [*ibid.*, 1952, v. 49, 507] observations on the value of immune serum in preventing experimental rabies. They prepared immune serum in a horse and concentrated it by a method similar to that employed for purification and concentration of diphtheria antitoxins. The virus used for challenge was first-mouse-passage from a fatal human case of rabies. In hamsters it was found that if 0.2 ml. of concentrated serum was inoculated intramuscularly (i.m.) into hamsters 3-96 hours after i.m. inoculation of 15 MLD of virus, the survival rate and incubation period were prolonged as compared with controls. Somewhat similar results were obtained when hamsters were treated with 6 intraperitoneal injections of 0.5 ml. of 5 per cent. UV-irradiated vaccine. When hamsters were treated with both serum and vaccine there was complete protection in one experiment. Experiments were made in 350-400 gm. guineapigs in which various doses of immune serum and vaccine were given. The highest survival rates were observed in groups of animals given immune serum (0.5 ml. i.m.) 24 hours after injection with 724 MLD of virus (titrated in guineapigs) followed by 6 intraperitoneal (1.0 ml.) or 6 intracutaneous (0.1 ml.) doses of vaccine (?) every other day.

Nine human beings who had been bitten by rabid animals (? 8 dogs and 1 cat) were treated with combined serum-vaccine treatment. The animals responsible in each case were shown to be infected with rabies virus either by virus isolation or by the demonstration of complement-fixing antigen in brain or salivary gland tissue. Except for 1 case (48 days) the time between treatment and the bite was 16 days or less. The quantity of serum or vaccine used is not stated except in one case in which 10-12 ml. of concentrated serum were given intraspinally and 20-30 ml. i.m. for 6 days. About a month later "as she was considered to have escaped the danger of developing rabies" she was given 10 daily intracutaneous inoculations (0.2 ml.) of UV vaccine. A high titre of antibody was found in the blood

immediately after starting serum therapy, which had dropped by 8 days after completion of the serum therapy. No antibody was found 20 days after completion of the course of vaccinations.

[It is unfortunate that the human infections are not more completely documented, and that no attempt was made to control the efficacy of immune serum. The results would suggest that it is of great value and most evidence suggests that it should be used in all cases of rabies. There are numerous typographical errors in this paper and also other errors such as 15 LD₅₀ in table 6 and 5 LD₅₀ in the text; 84 strain in the text, 48 strain in table 8, etc.]

G. W. A. Dick

ARCH. INST. PASTEUR DE TUNIS. 1955, Jan., v. 32, No. 1, 149-220. Service antirabique. Vaccinations antirabiques pratiquées sur l'homme de 1942 à 1951. [Antirabies Vaccinations carried out on Persons at Risk during the Period 1942-1951]

In this report the statistical records of antirabies treatment given at the Pasteur Institute of Tunis between 1942 and 1951 inclusive are analysed. The record for each of the 10 years reviewed is presented separately, details being arranged in the order and form recommended at the First International Rabies Conference held in Paris in 1927. In its assessment of the value of treatment the report makes use of corrected figures, taking account only of deaths from rabies occurring 12 or more days after the completion of treatment administered to persons proved or suspected to have been at risk. Thus persons bitten by animals remaining healthy 10 or more days after the time of biting and persons dying during treatment or within 12 days of its completion are excluded from the calculations. In this latter connexion it is stated that a period of 12 days after completion of treatment is necessary for the establishment of antirabies immunity.

Until March 1943 treatment was by Pasteur's dried cord method and thereafter by Fermi's phenolized vaccine; treatment was either ordinary or intensive, depending on the severity and site of wounding.

Results show that among 33,065 persons treated up to the end of 1942 there were 79 deaths (0.238 per cent.) classed conventionally as failures of treatment; of 1,297 persons treated in 1942 5 (0.38 per cent.) died of rabies, but of these only 2 (0.15 per cent.) could be regarded as failures of treatment. In the 9-year period 1943-1951 there were 11,560 persons treated and of that number 23 (almost 0.2 per cent.) died of rabies; of these 23, however, only 3 were regarded as failures of treatment, i.e., 0.026 per cent. of the total treated. During this period no case of paralytic accident was reported.

Corrected figures show that among 44,625 persons treated up to the end of 1951 there were 82 (0.183 per cent.) failures of treatment. In the 5-year period 1947-1951 there was no such failure.

G. Stuart

PECK, F. B., Jr., POWELL, H. M. & CULBERTSON, C. G. A New Antirabies Vaccine for Human Use. Clinical and Laboratory Results using Rabies Vaccine made from Embryonated Duck Eggs. *J. Lab. & Clin. Med.* 1955, May, v. 45, No. 5, 679-83. [15 refs.]

Powell and Culbertson [this *Bulletin*, 1950, v. 47, 733] described the cultivation of rabies virus in embryonated duck eggs and used the source of virus to prepare potent antirabies vaccines [*ibid.*, 1954, v. 51, 1238]. [The vaccines were prepared by inactivating the virus with nitrogen-mustard or mustard-like drugs.] This type of vaccine is almost devoid

of encephalomyelitis-producing qualities which is one of the dangers of using vaccine made of animal central nervous tissue. The result of a clinical trial of embryonated duck-egg vaccine is described. [The method of preparation of the vaccine which was used and the details of treatment are not mentioned.] Twenty patients who had minor bites and would not ordinarily have been vaccinated were each given a course of vaccine up to 14 inoculations. No systemic reactions were noted and local reactions were mild. Antibody studies were made on 13 of the patients; 12 had a demonstrable antibody response to the vaccine by the 14th day. The serum titres ranged from 1:4 to 1:27 in 10, one had a titre of 1:109 and another who had a history of previous antirabies vaccination had a titre of 1:2048. The early appearance of antibody is of great importance in rabies vaccination [and if it is confirmed that this vaccine has no encephalitogenic properties it should be of value in the field in conjunction with immune serum. From all available evidence the immediate injection of immune serum seems to be of prime importance in the treatment of human rabies. There is not sufficient evidence in human cases to say whether there is great advantage in combining immune serum treatment with a "killed" or an attenuated virus vaccine].

G. W. A. Dick

BHATTACHARYYA, M. N. Reactions after Antirabic Vaccination. *J. Indian Med. Ass.* 1955, May 16, v. 24, No. 16, 631-2.

"A case with neuroparalytic type of reaction after injection of antirabic vaccine with recovery is recorded."

KONAR, N. R., MONDAL, A. & CHOUDHURI, D. C. R. Paralytic Accidents following Antirabic Treatment. (Report of Two Cases treated with ACTH.) *J. Indian Med. Ass.* 1955, May 16, v. 24, No. 16, 632-4.

"Two cases of ascending myelitis following antirabic treatment are described. One of them also had bilateral paralysis of third, fourth and sixth cranial nerves. In about two months' time they had partial recovery from paralytic manifestations. Both the patients were treated with ACTH."

PLAQUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

MACLEAN, F. S. The History of Plague in New Zealand. *New Zealand Med. J.* 1955, Apr., v. 54, No. 300, 131-43. [11 refs.]

SANTER, M. & AJL, S. Metabolic Reactions of *Pasteurella pestis*. II. The Fermentation of Glucose. *J. Bacteriology.* 1955, Mar., v. 69, No. 3, 298-302, 2 figs. [12 refs.]

"The over-all fermentation pattern of glucose by *Pasteurella pestis* has been described. Experiments with 1-C¹⁴-glucose reveal that the Embden-Meyerhof scheme operates in the conversion of the hexose to its end

products. All attempts to demonstrate an operative hexose monophosphate shunt failed. The CO_2 produced during the fermentation arises from the dismutation of pyruvate."

ENGLESBERG, E. & LEVY, Judith B. **Induced Synthesis of Tricarboxylic Acid Cycle Enzymes as correlated with the Oxidation of Acetate and Glucose by *Pasteurella pestis*.** *J. Bacteriology.* 1955, Apr., v. 69, No. 4, 418-31, 4 figs. [28 refs.]

MORLAN, H. B. **Mammal Fleas of Santa Fe County, New Mexico.** *Texas Reports on Biol. & Med.* 1955, v. 13, No. 1, 93-125.

From July 1951 to February 1954 more than 26,000 fleas representing 53 species were collected from 8,784 mammals and 66 rodent nests in Santa Fe County, New Mexico. The fleas of birds and domestic animals were not investigated and from limited observation it is known that fleas were rare on cats and dogs. Domestic rats (*Rattus spp.*) are not known to occur in the area studied. A few house mice were examined but no ectoparasites were found on them.

The author lists the common and scientific names of the mammals examined and then presents a summary of information on host relationships, sex ratios, local distribution and seasonal abundance of each species of flea separately. It is emphasized that the records are influenced by an intensive 2-year study at the Municipal Airport and the sample is admittedly biased.

After a discussion of the data the conclusion is reached that much more information on host-parasite relationships is desirable before rodent-borne disease can be controlled economically. Nevertheless, a study such as this does provide a useful contribution to an understanding of the rodent-ectoparasite-disease complex.

H. S. Leeson

VARELA, G. & VÁZQUEZ, A. Hallazgo de la peste selvática en la República Mexicana. Infección natural del *Cynomys mexicanus* (perros llaneros) con *Pasteurella pestis*. [The Discovery of Silvatic (Wild-Rodent) Plague in Mexico. Natural Infection of *Cynomys mexicanus* (Prairie Dog) with *Pasteurella pestis*] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 219-23. [24 refs.] English summary (4 lines).

Since 1903 there have been numerous reports of the occurrence of plague infection among the wild rodents of the western States of the U.S.A., some of the affected areas being close to the northern boundary of Mexico.

In November 1954, the authors undertook a search for silvatic plague in Coahuila which adjoins the United States. From spleen suspensions of 2 out of 90 prairie dogs (*Cynomys mexicanus*) *Pasteurella pestis* was isolated.

There are records of the detection of isolated foci of plague in Mexico between 1902 and 1925, with a total mortality of 950. John W. D. Megaw

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

FELSENFELD, O., FREEMAN, N. L. & MOORING, Virginia L. **Tube and Slide Technic in the Hemagglutination of *Vibrio comma*.** *Amer. J. Trop. Med. & Hyg.* 1955, Mar., v. 4, No. 2, 318-20.

The observation by NETER *et al.* [Bull. Hyg., 1952, v. 27, 886] that *Bact. coli* serotypes 055 and 011 could be adsorbed on red blood corpuscles has led the authors to investigate the possibility of using the haemagglutination method for testing cholera sera, and to compare the slide technique with the tube method. As no sera from recent cholera cases were available the sera of rabbits inoculated with cholera vibrios of different types were used instead. The strains employed in preparing the sera and antigens were Inaba, Ogawa, and Hikojima, and only O sera and antigens were used. The vibrio suspensions, prepared after heating for 1 hour in a boiling water bath, were standardized to the sixth tube of MacFarland's nephelometer. Washed human O, rabbit, and sheep cells were used for adsorption, the packed cells being added to the suspensions to a concentration of 5 per cent. This mixture was incubated at 37°C. for 2 hours to let adsorption take place and the red cells were centrifuged out and washed 3 times with saline. This red cell suspension is called "adsorbed antigen". Sheep cells showed no advantage over human or rabbit cells.

When the adsorbed antigens were tested against increasing dilutions of homologous sera after incubation at 37°C. for 1 hour, and standing for 1 hour at room temperature, it was found that a 1 per cent. suspension of adsorbed antigen gave the best results and this concentration was used in all tests. The volume of adsorbed antigen and serum dilution was kept at 0.25 ml. as in Neter's technique and the serum dilution in the first tube was 1 in 20. The rabbit sera used did not agglutinate human or sheep red cells spontaneously, but this might occur with other batches of sera. Inactivation did not influence the results with rabbit sera.

Incubation for 1 hour at 37°C. in the water bath followed by 30 to 60 minutes at room temperature gave the highest agglutination titres. Only tubes showing clumps visible macroscopically were considered positive. The effect of buffering the antigen and serum was studied at optimal concentration and incubation, with saline buffered at pH 5.8, 6.2, 6.6, 7.0, 7.8, and 8.2. The maximum titres in all series were observed at pH 6.6 to 7.4 so that the use of buffered saline is unnecessary under normal laboratory conditions. The antigens for slide agglutinations were prepared in the same way and used in a 1 per cent. concentration.

One drop of each serum dilution and 1 drop of antigen were mixed in excavations on a slide which was then rocked and the results were read after 5, 10, 15 and 30 minutes at room temperature. Visible clumping appeared rapidly with homologous antigens and agglutination was complete in 15 minutes. With unadsorbed Inaba antigen the titre was 1 in 1280 in the tube test and 1 in 160 in the slide test, whereas with the adsorbed antigen the titres were 1 in 5120 and 1 in 2560 respectively. With Ogawa unadsorbed antigen titres were 1 in 1280 and 1 in 80 in the tube and slide tests while with the adsorbed antigen they were 1 in 5120 and 1 in 1280. Hikojima unadsorbed antigen gave titres of 1 in 640 in the tube test and 1 in 40 in the slide test, but the titres of the adsorbed antigen were 1 in

1280 and 1 in 1280. The slide method with adsorbed antigens should therefore be of some value in the examination of cholera sera.

C. C. B. Gilmour

OGASAWARA, K. & KARIYA, Y. **Lysine Decarboxylase of *Vibrio comma*.**
Nagoya J. Med. Sci. 1954, June, v. 17, No. 2, 91-2.

Seven strains of *Vibrio cholera* have been shown to produce an adaptive lysine decarboxylase enzyme at an acid pH, which converts lysine to cadaverine (pentamethylene diamine). The presence of cadaverine in the stools of cholera patients can probably be accounted for by the activity of this enzyme.

J. H. Marshall

DUTTA, N. K. & HABBU, M. K. **Experimental Cholera in Infant Rabbits: a Method for Chemotherapeutic Investigation.** *Brit. J. Pharmacol. & Chemotherapy.* 1955, June, v. 10, No. 2, 153-9. [45 refs.]

In spite of many investigations, no laboratory animal has proved entirely suitable for use in chemotherapeutic studies on *Vibrio cholerae* infections. The investigations reported here represent a continuation of such studies. Young mice, rats and guineapigs were not successfully infected by intra-intestinal inoculation of *V. cholerae*, but rabbits aged 10 days proved very susceptible to a strain rendered virulent by animal passage, when varying numbers were injected intra-intestinally under ether anaesthesia. The infection resembled human cholera in a number of respects. Data obtained on cell volume, urea and non-protein nitrogen content of the heart blood of animals *in extremis*, showed that all these values were above normal. For *in vivo* and *in vitro* tests, drugs were suspended in 6 per cent. gum acacia, and in the animal test they were administered by mouth with a small glass pipette. Treatment was begun 1 hour before infection or up to 24 hours later and continued at intervals of 8 hours till 9 doses had been given. When diarrhoea was noted intraperitoneal saline treatment along with chlortetracycline was started. In the test-tube experiments the drugs, serially diluted, were tested against different concentrations of vibrios in peptone water at pH 7.4.

The onset of illness was apparent within 24 hours of infection and death occurred within 14 to 52 hours, depending on the size of the infective inoculum. The pathological features of the disease in rabbits are described, and these animals are susceptible up to the 16th day of age. Chloramphenicol, chlortetracycline and oxytetracycline were found to be prophylactic but non-curative in action. Sulphaguanidine had some prophylactic action which was greater than that of formo-sulphathiazole. From the therapeutic point of view the *in vitro* results were not important.

J. D. Fulton

AMOEIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

REV. MED. CHILE. 1954, Sept., Suppl. No. 5, 44 pp. *Amoebiasis intestinal. [Intestinal Amoebiasis]* 1^a Reunión Anual de la Sociedad Chilena de Gastro-Enterología se efectuó en Santiago, los días 9 y 10 de diciembre de 1953.

This supplement sets out the 6 papers on intestinal amoebiasis read at the first annual conference of the Chilean Society of Gastro-Enterology held at Santiago in December 1953.

The papers consist of general accounts of particular aspects of the subject, extensions of work already published, and original observations. Each paper is followed by a list of references and a full account of the discussions, sometimes considerable, which followed the papers.

A. NEGHME and R. SILVA discuss the epidemiology and prophylaxis of amoebiasis in Chile, giving figures for incidence in various groups and regions in tabular form. Readers of this *Bulletin* will be familiar with this work of Prof. Neghme and his colleagues [this *Bulletin*, 1955, v. 52, 449, 485, 635].

P. GARCIA PALAZUELOS and DAVID SABAH deal with clinical features and differential diagnosis, based on 75 hospital patients seen between 1949 and 1953. The difficulties in diagnosis and the reasons for them are discussed. Detailed findings are given. The authors consider examination of the faeces to be of more diagnostic value than that of the rectal exudate.

A. DONOSO INFANTE discusses the various aspects of recto-sigmoidoscopy in intestinal amoebiasis and points to its value in diagnosis, control of treatment, extraction of exudate for examination, biopsy and detection of concomitant lesions. The various changes seen are described and their frequencies according to the author and others are tabulated. The only findings which the author regards as specific are crateriform ulcers, sub-mucous abscesses and punctiform depressions. These lesions occurred in 46.5 per cent. of the author's cases.

F. DIAZ refers briefly to radiological diagnosis and to the conditions in which it might prove of value.

J. FAIGUENBAUM, M. SANGÜESA, R. DONCASTER and M. MIRANDA treated 45 patients with aureomycin and 69 with oxytetracycline. The results are fully discussed in the text and tables. Of those receiving aureomycin 36 were free of amoebae 2½ months later. Tolerance in general was good, but 17 showed side-effects, mostly nausea: it was not necessary to suspend treatment on this account. In the case of those receiving oxytetracycline parasitological examination was made 8 days and then 3, 6, 9 and 12 months after treatment. Negative results, initially 97.8 per cent., fell to 76 per cent. at the fourth examination. There were side-effects in 15 patients, but treatment did not require to be suspended.

Although the antibiotics are easy to give and the period of treatment rarely exceeded 10 days, the authors consider as disadvantages the cost, the failure to cure all patients and the occurrence of some intolerance.

E. DOERR ZAVALA and F. TAG ESPINA used Wintodon (bismuth glycolyl-larsanilate Milibis) in 50 patients and set out the symptoms, the clinical, endoscopic and parasitological results in tables. After 6 to 9 control

examinations for amoebae, 39 patients were found to be negative. Side-effects occurred in 2. Sixteen patients were also treated with fumagillin and all but one became free of parasites: one complained of epigastric pain and tenesmus which disappeared after treatment. The results are regarded as satisfactory, though in the case of Wintodon there was not a clear correlation between clinical, endoscopic and parasitological findings. The patients treated with fumagillin were too few in number to allow of definite conclusions, but it appeared to be remarkably effective, though the authors had an impression that it was not so well tolerated as Wintodon in the dosage used.

H. J. O'D. Burke-Gaffney

ENTNER, N. & HALL, Nancy C. **Some Aspects of Carbohydrate Metabolism of *Endamoeba histolytica*.** *Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 92-9, 1 fig. [10 refs.]

Earlier studies by HALLMAN *et al.* [this *Bulletin*, 1954, v. 51, 584] have been made on the carbohydrate metabolism of *E. histolytica* in presence of accompanying bacteria and on the bacteria alone so that an indication of the activity of the amoebae was obtained. In the present investigation studies of the metabolism of *E. histolytica* were made in the absence of bacteria, with sugars labelled ^{14}C as substrates. Amoebae free from bacteria were obtained as described [this *Bulletin*, 1954, v. 51, 1062]. Radio-active maltose was prepared from the starch formed by tobacco leaf in the presence of $^{14}\text{CO}_2$, and was further hydrolysed to give uniformly labelled glucose.

It was found that the metabolism of amoebae plus bacteria was not the same as the sum of the two components alone when CO_2 , steam-volatile and non-volatile products were measured by the amount of radio-active carbon present in comparable suspensions; these results are summarized in a table. It was also shown that differences occurred according to the nature of the bacterial flora present. Maltose appeared to be metabolized at a greater rate than glucose, but in the past there has not been general agreement that *E. histolytica* does in fact use glucose. The identification of the products formed is being undertaken.

J. D. Fulton

BLUMENTHAL, H., MICHAELSON, J. B. & DELAMATER, J. N. **Some Aspects of the Phosphomonoesterase Activity of *Endamoeba histolytica*.** *Exper. Parasit.* New York. 1955, May, v. 4, No. 3, 201-7. [18 refs.]

" 1. *E. histolytica* has been shown to contain two separate enzymes having phosphomonoesterase activity.

" 2. The pH optima for these enzymes are respectively 4.6-4.8 and 9.4-9.6.

" 3. Both these enzymes are insoluble under the conditions of this assay.

" 4. Unit activities based on mmol of PO_4 released/100,000 amebae/30 minutes, have been determined."

BARANSKI, M. C. Sistematização das formas clínicas da amebíase intestinal. Estudo baseado em 70 observações. [Systematic Studies into Clinical Features of Intestinal Amoebiasis] Hospital. Rio de Janeiro. 1954. Dec., v. 46, No. 6, 599-609. [18 refs.] English summary.

ARMSTRONG, T. G., WILMOT, A. J. & ELSDON-DEW, R. The Antibiotic Residues in Amoebiasis. *Lancet*. 1955, July 2, 14-16, 1 fig.

The authors have already reported on the efficacy of certain antibiotics, penicillin and sulphathiazole in the treatment of severe ulcerative amoebiasis [this *Bulletin*, 1952, v. 49, 1120]. Of these the tetracycline compounds have proved to be the most powerful single therapeutic agents, and their action is on the bacterial flora in the bowel. BARNARD [*Lancet*, 1951, May 26, 1157] reported some success in the treatment of acute leukaemia with fermentation residues of antibiotics which modified the bowel flora. Such preparations are infinitely less costly than are the antibiotics, and they were tried on Africans suffering from acute ulcerative amoebiasis. The residue from the manufacture of Aureomycin was given in capsules in doses of 4 gm. daily for 10 days to 14 such patients. The known constituents were 80 mgm. of chlortetracycline and 24.4 μ gm. of cyanocobalamin; there was no actidione. No toxic side-effects accompanied the treatment, the result of which was (as shown in a histogram) considerably more successful than was a course of 15 grains of emetine given to a control group of patients.

A similar series of 19 patients was treated with 80 mgm. of pure chlortetracycline daily for 10 days; again the immediate effect was satisfactory, though the ultimate percentage of parasitic sterilization was not as high. A streptomycin residue in doses of 4 gm. daily for 10 days was then tried, but the immediate and ultimate results with this were not as good. An oxytetracycline residue was then similarly given to 10 patients, with a better result than the preceding.

These experiments suggest that the action of the antibiotic fermentation residues was in fact due to their antibiotic content. A small dose (100 mgm.) of chlortetracycline [Aureomycin] was therefore given for 10 days in conjunction with the systemic and intraluminal amoebicides, chloroquine diphosphate (500 mgm. daily for 15 days) and diiodohydroxyquinoline (1800 mgm. daily for 20 days), to 48 ambulant patients. The results in every respect were extremely good; the "success rate" was about 90 per cent.

Capsules or tablets, compounded to contain the chlortetracycline fermentation residue with chloroquine and diiodohydroxyquinoline, to be given orally thrice daily, might afford a very satisfactory method for the mass treatment of ambulant African patients suffering from amoebiasis.

A. R. D. Adams

SCHNEIDER, J. La lambliaise, étude clinique et traitement. [Giardiasis, Clinical Features and Treatment] Reprinted from *Rev. Praticien*. 1954, Sept. 11, v. 4, No. 23, 2111-15. [23 refs.]

This paper concerns itself with a text-book description of lambliasis (giardiasis) in children and in adults. Interest is centred on treatment. Mepacrine has largely been used, and recently attention has been centred on 4 amino-quinolines such as Sontochin (Nivaquine C), but this is no longer available, having been discarded for malaria. Chloroquine (Aralen) and camoquin have proved to be less efficacious. Recently Premaline has been advocated. This is a combination of quinacrine [mepacrine] 0.1 gm. and rhodopraequine 0.01 gm. in tablet form [this *Bulletin*, 1958, v. 35, 566]. For adults the dose is 3 tablets daily on the 1st, 3rd, 5th, 7th and 8th days.

Diphétarsone (Bémarsal) together with chloroquine has given very satisfactory results. Up to date the author with R. DUPOUX has treated 30 cases with 2 gm. Bémarsal and 0.3 gm. nivaquine [chloroquine] daily for 10

days. This combination appears to be the best, but until the results are confirmed, treatment with mepacrine or Premaline remains the standard.

Philip Manson-Bahr

BUDIANSKY, Estella. Aspetos clínicos da giardíase intestinal crônica na infância. [Clinical Features of Chronic Intestinal Giardiasis in Children] Hospital. Rio de Janeiro. 1954, Dec., v. 46, No. 6, 555-60. [12 refs.]

As examination of the faeces of over 11,000 persons, made between 1949 and 1953 revealed the presence of *Giardia intestinalis* in 11 to 17 per cent., the author made a clinical study of 117 children up to 13 years in 2 clinics in Porto Alegre, Brazil. The results are shown in 4 tables.

In all the children cysts—and occasionally vegetative forms—of *Giardia* had been found. Over half occurred between the ages of 1 and 5 years, and only 10 in those over 9; only 1 positive case occurred in a child under 1 year.

The predominant symptoms were recurrent abdominal pain (60), repeated diarrhoea (64), loss of appetite (28), nausea and vomiting (16), malnutrition, including two cases of coeliac syndrome (13), various nervous manifestations (10). Two patients were asymptomatic.

The children were treated with metoquine (mepacrine) for 5 days and in 89 who could be followed up symptoms disappeared completely in 70 and partly in 10, usually after a single course. In the 19 in whom symptoms persisted, 15 harboured other parasites, usually *Trichiuris*.

The disappearance of the symptoms after treatment suggested that there was a true relationship to the *Giardia* infection, at least as one factor, and the author recommends that in children who persistently carry *Giardia* in the stools and show one or more of the symptoms mentioned, treatment of the *Giardia* infection should be undertaken. If these symptoms are present and the stools are persistently negative duodenal intubation should be carried out as a diagnostic measure: where this is not possible (as in the present series) treatment should still be considered, in the absence of any other determined cause.

H. J. O'D. Burke-Gaffney

BENETAZZO, B. & TRONCA, M. Sulla patogenicità della *Giardia* (*Lamblia intestinalis*). Rilievi terapeutici con vari prodotti antimalarici. [The Pathogenicity of *Giardia intestinalis*. Results of Treatment with Certain Antimalarial Drugs] Arch. Ital. Sci. Med. Trop. e Parassit. 1955, Apr., v. 36, No. 4, 157-72. [30 refs.] English summary.

The authors start by discussing whether *G. intestinalis* is or is not pathogenic. Many have held that it is a harmless commensal, others that it is aetiologically associated with diarrhoea of a dysenteric type, meteorism and large pulaceous motions. The authors quote freely both opinions, but conclude that it is pathogenic. They next give many references to the results of treatment by various antimalarials, but most of the references are to small numbers, many 10 or less, but occasionally more, e.g., LAMADRID-MONTEMAYOR [this *Bulletin*, 1954, v. 51, 1251] who in 1954 treated 50 patients with chloroquine, 0.3 gm. daily for 5 days for adults and 0.2 gm. for children without causing any signs of intolerance. In other instances atebrin [mepacrine] was observed to reduce the numbers of cysts and to cause degeneration in others, but Aceranil got rid of them entirely.

The whole article is rather diffuse, giving many names and the drugs tried, but all is brought together in a useful table giving the authors' names, the dosage employed and the length of the courses of treatment by atebrin, Acranil, chloroquine, Nivaquine, Camoquine [amodiaquine] and Paludrine [proguanil]. Neither Acranil nor proguanil caused any signs of intolerance, but atebrin gave rise to nausea, and chloroquine to nausea and slight deafness, but in none severe enough to warrant suspension of the treatment.

The authors then refer in more detail to 87 cases of giardiasis under their own observation. Atebrin, Acranil or chloroquine was given in a total dosage of 3.5 gm. spread over 5 days and resulted in getting rid of the cysts; nevertheless it is suggested that after an interval fresh examination of the faeces should be undertaken and the course repeated. Paludrine was less successful. It was noted that in some instances, though the parasite could no longer be seen on faecal examination, the clinical symptoms might persist for some time until the diet was carefully regulated and vitamins and "choleretics" [? cholagogues] were given. [Several names are mentioned in the text but are not found in the bibliography.]

H. Harold Scott

NEEL, H. & NEEL, R. Sur un cas de lambliaose sévère et rebelle, guéri par la flavoquine. [A Severe and Refractory Case of Giardiasis cured by Flavoquine (Amodiaquine)] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 33-6.

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

SPARROW, Hélène. Les spirochètes des fièvres récurrentes et le pou (de l'origine des épidémies de récurrente à poux). [Relapsing Fever Spirochaetes and the Louse. (The Origin of Epidemics of Louse-Transmitted Relapsing Fever)] *Arch. Inst. Pasteur de Tunis.* 1955, Jan., v. 32, No. 1, 25-49, 20 charts.

The author, since 1944, has studied numerous strains of *Spirochaeta recurrentis* used in the treatment of more than 150 mental patients in the Tunis hospitals, and also had the advantage of being able to use a stock of lice which had been maintained since 1937 in connexion with studies on typhus and other rickettsioses.

A single meal on a patient during the first febrile attack was sufficient to infect lice. The ingested spirochaetes disappeared in a few hours from the alimentary canal, but reappeared in the coelomic fluid where they multiplied rapidly and remained present and virulent throughout the life of the insect, which was not shortened. The intestine and excreta do not contain spirochaetes and the infection is not hereditary in the louse. Small laboratory animals, such as rats, mice, guineapigs, and rabbits are not susceptible; but new-born rats and rabbits can be infected, as shown by BALTAZARD, and the strain maintained in them.

The author gives details of 20 patients inoculated by scarification of the skin with coelomic fluid of lice infected with *S. recurrentis*. Only one patient was refractory and was inoculated three times without becoming infected. The incubation period was 4 to 7 days and the duration of the first attack 5 to 7 days, followed by an interval of 5 to 9 days. The second attack was shorter than the first and occurred in only 13 patients. A

third relapse developed in 3 cases only. Attempts to reinfect 4 patients after intervals of 2, 3, 9 and 10 months from the first attack were negative. In treated patients, on the contrary, reinfection was obtained after intervals of 6 weeks, 2 and 3 months respectively.

The disappearance of the epidemic of louse-transmitted relapsing fever, early in 1947, resulted in the use of the Spanish-Moroccan strain transmitted by ticks. During 1947 to 1949 more than 100 patients were treated with this strain and details are given of typical cases. As a rule the temperature was lower than in infections with *S. recurrentis*, and the number of spirochaetes in the blood fewer, but with a greater number of febrile attacks. Lice were fed on patients during the first attack and in some cases became infected, depending on the number of spirochaetes in the blood and the number of infected feeds. The percentage of infected lice generally ranged from 1 to 10, but occasionally reached 30 per cent. The spirochaetes persisted in such lice until the death of the insect and also retained their virulence for man and guineapigs.

Six local strains of relapsing fever with the characters of *S. hispanica* were isolated and one of these showed the special characteristics of *S. recurrentis* in the readiness with which it developed in lice. All of one batch of 20 lice fed on the patient infected with this strain showed intense infections resembling those produced by *S. recurrentis*.

The author also describes an apparent case of mutation in the Langeron strain of *S. hispanica*, which had been used for 3 years and always gave similar results in its reactions. Then a patient inoculated with the blood of a guineapig at the 95th passage, containing numerous spirochaetes, developed an atypical infection with 4 febrile attacks. Spirochaetes were present in the first three, but could not be found in the fourth attack. The blood of the first attack infected two guineapigs, but that of the third and fourth attacks did not produce infections. Two guineapigs inoculated with the blood of the fourth attack remained negative for 12 days and then died.

At the same time, the blood was inoculated into another patient who showed a similar type of infection, with 4 febrile attacks. Lice fed on this patient readily became infected and showed numerous spirochaetes in the coelomic fluid; these were used for the infection of four other patients, all of whom showed typical symptoms. When inoculated into guineapigs, however, the spirochaetes were found to have lost their virulence for this animal but the strain was maintained in new-born rats and is now in its 122nd passage. It has retained its capacity for developing in lice and in its general characteristics resembles *S. recurrentis*. These results support the theory, originally advanced by NICOLLE and ANDERSON, that strains of relapsing fever normally maintained in ticks, may under certain conditions become adapted to transmission by lice.

Edward Hindle

LAVOPIERRE, M. M. J. & RIEK, R. F. **Observations on the Feeding Habits of Argasid Ticks and on the Effect of their Bites on Laboratory Animals, together with a Note on the Production of Coxal Fluid by Several of the Species studied.** *Ann. Trop. Med. & Parasit.* 1955, Mar., v. 49, No. 1, 96-113, 2 text figs. & 6 figs. on 2 pls. [36 refs.]

Several workers have observed and remarked on the macroscopic appearance of the lesions following the bites of *Ornithodoros* ticks, although there are fewer observations regarding the histological changes involved. The authors of the present paper have studied the macroscopic and histological appearance of the lesions produced on white rats by the bites of 29 species

of soft ticks belonging to the genera *Ornithodoros* and *Argas*. A few observations were also made on factors influencing the ticks' readiness to feed, the time taken to feed, the mechanism of feeding and the production of coxal fluid by the ticks.

The actual feeding time varied with the species of tick, *O. erraticus* feeding more rapidly than *O. tartakovskyi* or *O. moubata*. The penetration of the host skin by the mouth parts was observed in the case of *O. moubata* and *O. tholozani* var. *typicus* by transilluminating the ear of a mouse on which the ticks were feeding [see also this *Bulletin*, 1953, v. 50, 460]. Blood from the tissues lacerated by the chelicerae collected at the tips of the cheliceral digits was sucked up. This sucking activity alternated with periods of rest during which saliva was pumped in. As the ticks neared repletion, blood spread into the surrounding tissues from the point of entry of the mouthparts, this spread probably being aided by an anticoagulin and possibly a spreading factor resembling hyaluronidase present in the saliva.

A study of the reactions following the bites of ticks showed that after the ticks had fed and detached, a circular haemorrhagic area appeared in the skin at the site of the bite. There was considerable infiltration of neutrophils (and in the case of cotton-rats of eosinophils) into this area; but there was no evidence of any haemolysis. As a general rule large individuals produced a more severe reaction than smaller individuals of the same species. On the basis of the macroscopic and histological changes in the host skin, the authors have divided the ticks into 2 major groups, the *O. moubata* and *O. erraticus* groups and 2 subsidiary ones, the *O. savignyi* and *Argas* groups. Ticks belonging to the *O. moubata* group are slow feeders and the reaction they produce on the host skin is less severe than that produced by ticks of the *O. erraticus* group which are rapid feeders. The lesions produced by the latter group may increase in diameter to 12 mm. or more, are raised above the surface and always become ulcerated before healing finally. The adults of *O. savignyi* produced a deep extensive haemorrhage but there was no raising of the skin at the site of bite. Compared with these 3 groups, the *Argas* species studied produced only an insignificant reaction, or no visible reaction at all.

The authors point out in their discussion that the bite reactions were studied mostly in laboratory animals and that there was some evidence to indicate that the reactions may be milder in the natural hosts of the ticks. It may also be possible to separate morphologically indistinguishable races of ticks on the basis of the reactions they produce on the host animals. The salivary secretion of the ticks contains only slow-acting haemolysins which help the tick to digest the blood meal in the stomach.

Observations on the production of coxal fluid by late nymphs and adults showed that the ratio of coxal fluid produced to the blood ingested was lower in ticks belonging to the *O. moubata* group than in ticks belonging to the *O. erraticus* group. The authors emphasize the importance of the coxal fluid in the epidemiology of tick-borne relapsing fever. According to them, ticks of the *O. moubata* group (*moubata*, *turicata* and *rudis*) are more efficient vectors because infective coxal fluid is produced while the ticks are still attached to the host, the fluid thus readily contaminating the bite wound. On the other hand, ticks of the *O. erraticus* group (*erraticus*, *talaje* and *tholozani*) are not efficient vectors because coxal fluid is excreted either after the mouthparts are withdrawn or after the fed ticks have dropped off.

[Discussing the reasons for differences in vector efficiency of the 2 groups of ticks, the authors say, "It is certainly not due to the absence of spirochaetes in the coxal fluid, for in individuals of both groups of ticks the coxal fluid . . . has been found to contain spirochaetes".] However, the

abstracter has been able to confirm the observation of KEMP *et al.* [this Bulletin, 1935, v. 32, 296] that the coxal fluid of infected *O. turicata* is always free of spirochaetes as proved by microscopical examination and inoculation into animals. Similar results have been obtained by MOSKWIN [*ibid.*, 1930, v. 27, 109] for *O. tholozani* (= *papillipes*), by DAVIS (*J. Parasitol.*, 1941, v. 27, 425), for *O. parkeri* and by RAO and KALRA [this Bulletin, 1950, v. 47, 857] for *O. tholozani* var. *crossi*. It would appear therefore that transmission of the spirochaetes by at least some vector species is solely due to the bite and not due to the coxal fluid.]

M. G. R. Varma

DAVIS, G. E. & MAVROS, A. J. **The Long Survival of *Borrelia hispanica* (de Buen) in the Argasid Tick *Ornithodoros nicollei* Mooser. A Problem in Xenodiagnosis.** *Exper. Parasit.* New York. 1955, May, v. 4, No. 3, 277-81.

The authors describe the recovery of a spirochaete, erroneously thought to be *Spirochaeta venezuelensis*, after it had survived 5 years in *Ornithodoros nicollei*. A batch of *O. rudis* had been received from Panama and were fed on white mice, and one of these showed spirochaetes in the blood, which were assumed to be *S. venezuelensis*. Ten specimens each of *O. turicata*, *O. parkeri*, *O. hermsi*, *O. tholozani*, *O. talaje* and *O. nicollei*, were fed on a mouse infected with this strain, and subsequently these ticks were given three test feedings and failed to produce any infection. Nearly 5 years later these ticks were given an additional feeding with negative results and then each lot was triturated and inoculated into mice. All remained negative except the mice inoculated with the triturate of *O. nicollei*. The spirochaete thus obtained was again tested for transmission by the bites of *O. nicollei* with negative results, but was found to be readily transmitted by *O. erraticus*. Further experiments confirmed the identity of this spirochaete as *S. hispanica*.

The spirochaete had not changed immunologically during its 5-year period in *O. nicollei*, nor in its specific relation to its normal vector, *O. erraticus*. It is evident, therefore, that when more than one species of ticks occur in the same habitat and feed on the same hosts, the recovery of spirochaetes from the triturates is no certain indication that the organism is transmitted by the tick in which it was found. Edward Hindle

VAISMAN, A. & HAMELIN, A. **Étude de l'immunité des rejetons dans les infections récurrentielles chez le cobaye, le rat et la souris. [A Study of Immunity in the Offspring of Guineapigs, Rats and Mice after Infection with Relapsing Fever]** *Ann. Inst. Pasteur.* 1955, May, v. 88, No. 5, 665-8.

It is well known that the serum of mice, rats and guineapigs infected with either *Spirochaeta duttoni* or *S. hispanica* contain specific immobilizing antibodies which act on the organisms [this Bulletin, 1953, v. 50, 941; 1954, v. 51, 590]. The authors have tested offspring of rats and mice after infection with *S. duttoni*, including 9 rats aged 24 or 25 days, and 11 mice of ages ranging from 20 to 39 days. Three of each group were examined for the presence of antibodies and brain virulence and were all negative; the remainder were inoculated with the homologous strain of spirochaete and all became infected.

A second series of experiments was made with the offspring of guineapigs, rats and mice, after infection with *S. hispanica*. In this case also the

young mice showed no antibodies in the blood and were susceptible to infection. But the young guineapigs and rats contained antibodies and were resistant to infection. In all cases the brains of those examined, whether resistant or not, showed no sign of any residual infection.

[The headings of the two tables in the original article seem to have been transposed; Table I should read *duttoni* instead of *hispanica*, and Table II *hispanica* instead of *duttoni*.]

Edward Hindle

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

ROGERS, L. **Eradication of Leprosy in British Territories. Rôle of Repeated Surveys of Contacts.** *Lancet.* 1955, July 9, 80-82.

A survey is made of the estimated number of people with leprosy in the areas under British administration. These are divided into 4 categories. (1) Surveyed areas of East and West Africa, with about 245,000 in the former and 400,000 in the latter. (2) Unsurveyed territories with high prevalence per 100 sq. miles, such as Hong Kong with 9,846 patients per 100 sq. miles, where new patients keep coming in rapidly from the mainland. (3) Unsurveyed territories with moderate prevalence, such as the Gold Coast (20,000 total cases), Sierra Leone (18,000), Malaya, etc. (4) Unsurveyed territories with low prevalence, such as Somaliland, Union of South Africa, South African Protectorates, British North Borneo and the Solomon Islands.

Sir Leonard Rogers reaffirms his advice that only highly infective cases should be isolated, the population of controlled areas should be surveyed every 2 years or so for a decade, and all new cases (as well as other non-infective cases) should receive treatment as out-patients.

An estimate is made that there are still 750,000 people with leprosy among the 68 million inhabitants of all these territories, and distributed over $2\frac{1}{2}$ million square miles. "Especially now that the more effective sulphone treatment is available, it is possible to envisage the steady reduction, and eventual eradication, of the disease—given the necessary staff and funds."

Ernest Muir

REYES, E., BARRIENTOS, E., RODRÍGUEZ, J. J., RAMÍREZ, O. & CARRANZA AMAYA, A. Contribucion al estudio de la lepra en El Salvador, C.A. [Observations on Leprosy in Salvador, C.A.] *Archivos Colegio Med. de El Salvador.* 1953, Dec., v. 6, No. 4, 403-12, 11 maps.

The first case of leprosy recorded in Salvador was in 1885 in a Negro imported to work in the mines when the Indians refused to work there. There were later many people with leprosy in that same town. There was no further account of leprosy till 1937 when Professor REYES made a study staining sections with Ziehl-Neelsen stain. In 1953, out of a population of 1,929,756 the number of people known to have leprosy was 62, with 10 of the 14 administrative departments affected. No leprosy was found among pure Indians [American], but only among Indians of mixed race. Modern treatment is bringing the disease under control. Ernest Muir

LEIKER, D. L. & SLOAN, N. R. **Leprosy in Netherlands New Guinea.** *Internat. J. Leprosy.* New Orleans. 1954, Oct.-Dec., v. 22, No. 4, Pt. 1, 481-9, 1 fig.

[See this *Bulletin*, 1954, v. 51, 1253.]

MONTEL, M. L. R. Erythème noueux vrai (dermatite contusiforme) d'origine lépreuse. Que faut-il entendre par: *Erythema nodosum leprosum?* [True Nodular Erythema (Contusiform Dermatitis) of Leprous Origin. Significance of the Term *Erythema nodosum leprosum*] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 15-19.

A detailed study is made of a case of true nodular erythema due to Hansen's bacilli. At first there were abundant bacilli in the lesions, but as the eruption subsided the bacilli disappeared. A residual slight nodular erythema persisted, resembling what is generally known by leprologists as erythema nodosum, but in the author's opinion different from that condition. The tuberculin and Mitsuda tests had both been negative before, but after BCG vaccination performed at the end of the first eruption the tuberculin reaction became positive on the 367th day, and the Mitsuda on the 425th day with a late reading on the 56th instead of on the 15th to 25th day.

[The condition described corresponds with the acute reaction which sometimes occurs in tuberculoid cases, but erythema nodosum occurs in lepromatous cases.]

Ernest Muir

GUNS, P. & LECHAT, M. La lèpre. Aperçus généraux et points particuliers d'otorhinolaryngologie. [Leprosy. General Appearances and Particular Points about Ear, Nose and Throat Lesions] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 15-28. [20 refs.]

After some generalizations about leprosy, the authors describe in detail the clinical appearances found in the nose, larynx and pharynx of 37 patients, 27 of whom had not made any complaint of symptoms of these parts. They also give the bacteriological findings, erythrocyte count, and haemoglobin percentage. Statistics are quoted of the hopeful condition of leprosy control in the Belgian Congo. Of the 200,000 estimated cases only 20,000 are lepromatous, and of these 60 per cent. will tend towards cure.

Ernest Muir

MONTESTRUC, E., LE SAGET, M. & BERDONNEAU, R. La thérapeutique sulfonée dans la lèpre par voie intramusculaire. [Sulphone Treatment in Leprosy by the Intramuscular Route] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 64-78, 8 charts.

While acknowledging the advantage of giving DDS orally, the authors require a method of injecting it intramuscularly in a suspension for patients who live at a distance from the doctor or who are suspected of not absorbing the drug by the oral method.

To determine the method of intramuscular administration with the most continuously sustained blood concentration curve, the following dosages were tried out in 8 patients: 2 patients orally on 200 mgm. daily for 6 days a week; 3 patients with intramuscular injections every 3 weeks of 1.5 gm. of large-grained DDS in a 2 per cent. suspension in agar solution; 1 patient on a suspension of 1.25 gm. in groundnut oil given every 8 days; 2 patients with 1.25 gm. of DDS in chaulmoogra esters every 8 days. The last of

these forms of intramuscular injection is preferred, after a study of the DDS concentration curves, not because any therapeutic effect is expected from the chaulmoogra esters, but because the curve is more sustained.

Ernest Muir

GRUNBERG, E., TITSWORTH, E. & THOMAS, M. **Lack of Lasting Protective Effect of Isoniazid in *M. lepraeumurium* Infection of Rats.** *Proc. Soc. Exper. Biol. & Med.* 1955, May, v. 89, No. 1, 34-6, 1 fig. [10 refs.]

"1. Isoniazid delays the development of the leproma and extends the survival time of white rats infected with *M. lepraeumurium*. 2. Both phenomena are directly proportional to the increase of dose as well as to the extension of the duration of therapy with isoniazid. 3. Viability of the bacilli is affected by therapy but under the experimental conditions used the organisms are not completely eradicated."

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—TREMATODES (schistosomes, other flukes); CESTODES (Diphyllobothrium, Taenia, Echinococcus, other cestodes); NEMATODES (Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).

MACKIE, A. & PARNELL, I. W. **A Comparison of the Results of Four *in Vitro* Anthelmintic Testing Techniques.** *J. Pharmacy & Pharmacol.* London. 1955, June, v. 7, No. 6, 416-20. [14 refs.]

The 4 techniques studied consisted of (1) adding the compounds to fresh horse faeces containing sclerostomes, and later culturing and comparing the number of larvae from treated faeces with the number from untreated ones, (2) applying the compounds to sections of *Ascaris lumbricoides* attached to a kymograph lever, (3) the same procedure with complete specimens of *Fasciola hepatica*, and (4) adding one volume of the solution of compound to an equal volume of vinegar containing vinegar eel worms. The results of testing 52 compounds are set out in a table. The results show (as might be expected) that the potency of many compounds varies considerably according to the species of the helminth tested. [For further details, the original paper should be consulted; the main emphasis is upon nematodes of agricultural importance.]

F. Hawking

OLIVER-GONZÁLEZ, J., BAUMAN, P. M. & BENENSON, A. S. **Species Specificity of the Anti-Egg Precipitin in Schistosome Serums.** *J. Infect. Dis.* 1955, Jan.-Feb., v. 96, No. 1, 95-100, 6 figs.

In a previous paper [this *Bulletin*, 1955, v. 52, 55] the senior author reported the formation of a precipitate *in vitro*, around the eggs of *Schistosoma mansoni* when these were immersed in the sera of infected persons or monkeys. In the present paper the authors describe the results of extending these observations to include the examination of sera from persons known to have long-standing *Schistosoma haematobium* infections acquired

in Egypt, from Puerto Ricans with *S. mansoni*, from white Americans who had become infected with *S. japonicum* while in the Philippines, and from various laboratory animals which had been experimentally infected with, or artificially immunized against, *S. japonicum*, *S. mansoni* and *S. haematobium*. In addition they looked for cross reactions in sera obtained from Japanese patients infected with *Paragonimus westermani* and from cattle infected with *Fasciola hepatica*.

In view of the results obtained, a summary of which appears below, the authors believe that they have confirmed the practical value of the "circumoval precipitin" reaction as a means of diagnosing schistosome infections.

" 1. Living schistosome eggs become surrounded by precipitate when incubated at 37°C with homologous antiserums, both from natural and experimental infections, or artificial immunization.

" 2. This reaction is species specific with no cross reaction when *Schistosoma hematobium* or *Schistosoma japonicum* eggs are used as antigen, but there is a minor crossing when *Schistosoma mansoni* eggs are incubated in *S. hematobium* or *S. japonicum* antiserums.

" 3. No cross reaction could be demonstrated with the serums from humans infected with *Paragonimus westermani* or from cattle infected with *Fasciola hepatica*. No circumoval precipitate could be demonstrated when *F. hepatica* eggs were incubated with serums of infected cows, an observation which may correlate with the form of the disease in the mammal." [The authors suggest that these negative results may have been due to the fact that in liver fluke infections caused by *F. hepatica* there is no tissue invasion by the eggs and therefore inadequate stimulation for the formation of antibody.]

" 4. The merits of the circumoval precipitin test as a diagnostic procedure permitting specific diagnosis are discussed."

R. M. Gordon

MOHAMED, A. S. **Cystic Disease of the Urinary Tract and its Relation to Bilharziasis and Malignant Neoplasms.** *J. Egyptian Med. Ass.* 1954, v. 37, No. 9, 987-1065, 26 figs. [30 refs.]

Two types of cystic formation in the bladder are described—cystitis cystica and cystitis glandularis. These are encountered all over Europe and America. With regard to their occurrence in Egypt, MADDEN (1907) stated that in some cases of schistosomiasis of the urinary tract rounded globules containing clear or turbid fluid, like small blisters, are seen in the epithelium of the mucous membrane. Later, FERGUSON also considered that they were a concomitant manifestation of schistosomiasis. The cysts may also be found in the ureter.

Today most observers believe that these cysts originate in downgrowths which arise from the epithelial lining of the mucous membrane and extend into the submucous fibrous tissue. A portion of the epithelial downgrowths thins out to form a connecting epithelioid stalk which becomes snared off, leaving the epithelial masses free in the submucous fibrous tissue. In the presence of chronic inflammation they continue to proliferate and their central cells undergo hydropic and colloid degeneration with liquefaction and cyst formation. In addition it is believed that some of the vesical cysts are lined by one layer of columnar cells, which, as they are mucoid in character, secrete mucus. These cysts are considered an independent type and are referred to as cystitis glandularis. They probably either originate from mucous gland nests or differentiate from epithelioid nests into mucus-secretory type of cells.

Professor Mohamed, of the Kasr-El-Aini Medical Faculty, Cairo, noticed a high incidence of these cysts in the mucosa of bladders and ureters in autopsies performed in his pathology department. He reviewed the autopsy records over 2 years (1937-8) and found the incidence much higher than that reported by other writers on the subject from abroad.

Of the 300 cases studied, schistosomal disease was found in the bladder in 164 (55 per cent.) and of the 220 cases in this series in which reports were made on the ureters, 84 (38 per cent.) showed schistosomal infection. There were 20 cases of cystic cystitis and 26 of cystic ureteritis—all in cases with schistosomiasis of the bladder or ureter. No cystic cystitis or cystic ureteritis was found in any case in which the urinary bladder or ureter was free from schistosomal infection. It is evident that cystic formation in the bladder and ureters must have a close aetiological relationship to schistosomal infection of these viscera. No cysts were discovered in the renal pelvis.

The incidence of cystic ureteritis in schistosomal ureters was much higher than that of cystic cystitis in schistosomal bladders. Most of the cases of cystic cystitis or ureteritis occurred between the ages of 21 and 50 years. Five females were affected in contrast to 34 males, thus showing a distinctly higher incidence in the male sex.

In the urinary bladder the cysts were found most commonly in the trigone and around the ureteral orifices and less often elsewhere. Their distribution in the ureters was variable and although mainly limited to the lower third they were occasionally distributed along the whole length of both ureters. Their number varied; in some cases they were few and in others numerous. The size of the cysts differed, too. In some they were so small that they were only detected microscopically. Those visible to the naked eye varied again from the size of a pinhead to that of a pea. Their colours differed greatly too, ranging through translucent pale white, pale yellow, orange, reddish and even black. The cysts contained a clear watery or a turbid fluid or granular detritus. In between the cysts the mucosa showed evidence of schistosomiasis.

The author discusses the pathogenesis of the cysts from two aspects—firstly the cystic manifestations in schistosomal subjects and secondly those in non-schistosomal ones.

The appearance of the cysts both macroscopically and microscopically are nearly the same in both groups. The author mentions that the non-schistosomal cysts may reach the size of 3 cm. and are usually much larger than the schistosomal cysts. Other points of difference between the two groups are outlined. In schistosomal cases the frequency of the cysts in the urinary tract is greatest in the ureter, then in the bladder and last in the renal pelvis, whereas in the non-schistosomal group they are most frequent in the urinary bladder. In schistosomal cases they are more numerous in the lower third; but in the non-schistosomal group they are more common in the upper third.

In non-schistosomal cases, the cysts are to be found at any age, but more commonly in old age, whereas in schistosomal subjects their incidence is highest in young adults and in those of early middle age.

Chronic inflammation in the non-schistosomal group, on one hand, and schistosomal infection in the schistosomal group, on the other, are not merely accidental associations but primary aetiological factors in the production of the cysts. Is there a common exciting factor for this cyst formation?

In the author's opinion, the architecture of the 3 anatomical layers that constitute the wall of the ureter and bladder is an important aetiological factor in the production of polypi and cystic changes in the mucosa, when

fibrotic changes and scarring in the submucosa are superimposed. The essential pathological changes leading to cystic formation are the diffuse, irregular and progressive scarring of the submucous and muscular coats, the adhesions through fibrosis of the mucous, submucous and muscular coats of the wall of the ureter and bladder, and subsequent contraction of newly formed fibrous tissue which pulls outward the epithelial layer in the form of pouches and *culs-de-sac*.

Finally the author discusses the association of malignant disease with schistosomiasis of the urinary bladder and with cystic disease of the urinary tract. Out of the 300 autopsies which he studied in this work, he found 16 cases with malignant disease in the urinary bladder and only one in the left ureter. (The incidence of malignant disease in the urinary passages was thus 5.66 per cent.) The 16 cases of vesical carcinoma revealed as well schistosomiasis of that viscus. He could find no association between glandular cystitis and cancer as only a few of the malignant bladders showed cystic changes.

M. Gelfand

NAËM, M. M. **A Study of Spatial Vectorcardiography in Bilharzial Cor Pulmonale.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 2, 110-24.

MUSTAFA, A. H., HANNA, M. & SHEHATA, A. H. **Oral Treatment of Bilharziasis in Children with Miracil D.** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 72-9. [10 refs.]

Fifty children, in Cairo, found to be infected with *Schistosoma haematobium* were given Miracil D by mouth in doses of 16-24 mgm./kgm. of body weight, divided into two doses daily, for 7 days; 48 of them were freed of eggs in the urine by the third week after the treatment and remained so for the 6 months of observation, so they were cured. Side effects of the treatment were vomiting, colic, headache, and yellow staining of the face; they were not severe and soon vanished after the treatment. Six of the children had a concurrent *S. mansoni* infection; this was cured by the treatment in all cases. It was noticed that 8 children passed many threadworms on the 4th day of treatment. Miracil D is a safe and effective drug for the oral treatment of both urinary and intestinal schistosomiasis.

[The criteria of infection and of "cure" were the presence or the absence of eggs on examination, at intervals, of single specimens of the urine or stools.]

A. R. D. Adams

ANN. SOC. BELGE DE MÉD. TROP. 1954, Oct. 31, v. 34, No. 5, 713-50.

[35 refs.] Essai statistique sur la signification réelle en pathologie congolaise de la bilharziose intestinale à *Schistosoma mansoni* [GILLET, J. (713-26)] [Statistical Study of the Actual Significance of *Schistosoma mansoni* Infections as a Cause of Morbidity in the Belgian Congo]; The Actual Significance of Infestation with *S. mansoni* as a Factor causing Ill-Health [MORRIS, R. M. (727-34)]; Preuves cliniques et histo-pathologiques de l'importance de la bilharziose mansoni [Clinical and Histopathological Evidence of the Importance of *S. mansoni* Infections] [DE AZEVEDO, J. F. (735-7)]; Discussion [DE AZEVEDO, J. F., President (739-50)].

i. GILLET in an opening paper dealt with the pathological importance of schistosomiasis due to *S. mansoni* in the Belgian Congo. The first cases of

this infection in the territory were recognized in 1897; thereafter it was found widely in varying intensity; in 1952 some 17,000 cases were diagnosed. The intensity is greatest in the Eastern Province and in Katanga, and it has spread therefrom along trade and travel routes to most parts of the territory, in which it occurs even at high altitudes with a temperate climate.

The annual medical reports show that of some 340,000 patients treated in government hospitals in the period 1927-30 some 6.5 per thousand were found to suffer from *S. mansoni* infections; in the period 1951-52 of 2,579,000 sick examined in the hospitals 5.6 per thousand were found to suffer from the disease. The mortality due to it fell from 31.1 per thousand to 3.5 per thousand infected, between the two periods; the former of these figures doubtless was exaggerated by some concurrent acute infection; during the immediately ensuing 5 years it fell to 9.6 per thousand.

Investigations, from which some conclusions are given in the text and in tables, show that in some endemic foci of the disease the pathological lesions caused by it are less than in other areas where the actual incidence of the infection is lower. Also in any given area the manifestations of the disease may vary markedly among different sections of the population. In one area mentioned there is a high incidence of infection in the mining population with minimal consequences, whereas among the villagers, with an equal incidence of infection, the disease is severe. In another the severity of the disease in these two types of population is reversed; and in yet another no differences have been noted in its effects on either. The differences are doubtless due to local epidemiological factors; but, in general, heavy and frequently repeated cercarial invasion results in severe disease, whereas infrequent and light cercarial infections result in few or no symptoms.

ii. MORRIS surveyed the position in S. Rhodesia, where *S. mansoni* infection is common but patchy in distribution and has an incidence of only one quarter of that due to *S. haematobium* infection. It has already been shown that *S. mansoni* eggs are remarkably widely distributed in the body [GELFAND and Ross, this *Bulletin*, 1953, v. 50, 956], and additional examinations of African men and women dying from all causes in S. Rhodesia sustain the findings. The ova of *S. mansoni* can be recovered from the bladder walls of about a third of those with the infection, though these eggs are rarely recovered in the urine. Eggs in some cases may be found post mortem in sundry tissues without a surrounding cellular reaction, though in others their presence causes schistosomal tubercles, which may develop into larger "bilharziomata"; even the latter do not always cause symptoms.

The symptoms of infection are inconstant; in cases where eggs are very numerous in the wall of the large intestine there may be acute schistosomal dysentery with fever, but this condition is never fatal. The chronic stage of the infection seen in S. Rhodesia is not attended by the gross changes stated to be found in the recto-anal region in Egypt and S. America, and the infection in S. Rhodesia does not seem to precipitate malignant changes in the large bowel. Cirrhosis of the liver, with splenomegaly and ascites, is common in S. Rhodesia; in roughly half the cases proof of the presence of one or other of the schistosomiases is forthcoming; the geographical distribution of the conditions, however, is by no means synchronous and the syndrome is found in areas where there is no schistosomiasis. Though essential pulmonary hypertension and right heart failure are not uncommon in S. Rhodesia, there is no evidence that these are due to *S. mansoni* infection, as is stated commonly to be the case in Egypt. Only 3 cases of spinal cord lesions attributable to the disease have been recognized in S.

Rhodesia. Schistosomiasis due to *S. mansoni* there, therefore, is not a fatal disease, and it causes much less ill health than is ascribed to it in other countries of its endemicity. This may be due to the relatively light worm infections found to be present in this part of Africa.

iii. DE AZEVEDO said that the schistosomiases had for long been regarded as diseases of secondary importance to the indigenous inhabitants of the endemic areas, but later work had shown them not to be so. Liver involvement is so commonly a result of schistosomiasis due to *S. mansoni* as to constitute an index of its presence. In Mozambique among children between 7 and 15 years of age the incidence of enlargement of the liver was proportional to the incidence and severity of *S. mansoni* infection. There were corresponding changes in the albumin/globulin ratio, and in liver function tests. *S. mansoni* schistosomiasis is a disease of major importance and every effort must be made to combat it and to limit its extension.

iv. In the discussion which followed RODHAIN said he was impressed by the divergence of views on the gravity of *S. mansoni* infection and he wondered how they could be reconciled. Later in the discussion he stated that he had no doubt that there developed an immunity to hyperinfection with the schistosomes, and that this has a bearing on the problem. Furthermore, schistosomal infection is rarely found as a single infection, but it is concurrent with a variety of other diseases and infections which complicate the pathology and render the true picture difficult to obtain.

SCHWERS, SACRÉ, WADDY, LIMBOS and others also thought that the conditions of life and the presence of co-existent infections influenced the appearance of gross pathological manifestations due to *S. mansoni* infection. CHESTERMAN drew attention to the frequency of intestinal complications due to *haematobium* schistosomiasis in certain parts of Africa, and also to the presence of another form of intestinal schistosomiasis, that due to *S. intercalatum*. He emphasized the diagnostic superiority of the rectal snip technique and he also reminded his hearers that ova of the schistosomes have been found in most organs of the body and that paired worms have been found in very bizarre situations. He emphasized the need for a depot-forming drug, which could be used prophylactically to prevent egg laying and to break the life cycle, and to serve as a suppressive of the clinical disease in man. SCHNEIDER and FIRKET said that hepatic cirrhosis in Africa was so commonly due to malnutrition, to malaria, and to various toxic factors, including alcohol, and to infections that it was impossible to determine what part schistosomiasis plays in its production. The contributors of the paper shared in the general discussion and further elaborated their views.

A. R. D. Adams

NEWTON, W. L. & von BRAND, T. **Comparative Physiological Studies on Two Geographical Strains of *Australorbis glabratus*.** *Exper. Parasit.* New York. 1955, May, v. 4, No. 3, 244-55. [13 refs.]

" 1. Two laboratory-reared strains of *Australorbis glabratus*, derived originally from Venezuela and Brazil, showed no difference in inorganic substances, ether extract, and nitrogen content. The shells of the Venezuelan strain were significantly heavier than those of the Brazilian one, and the former stored about twice as much polysaccharide as did the latter..

" 2. Neither strain was capable of using inulin or a dextran from *Leuconostoc* to synthesize polysaccharide. The feeding of cornstarch, or cornstarch fraction A, leads to a pronounced and equal synthesis of polysaccharide

in the two strains, indicating that the difference in polysaccharide levels maintained on the normal diet was not due to differences in synthesizing or storage capacity.

"3. Both strains had an identical rate of oxygen consumption, but the Brazilian snails produced significantly less anaerobic carbon dioxide than the Venezuelan ones. An increase in the polysaccharide content to the same high level in both strains led to an increase in anaerobic CO_2 production in both, but the percentage difference between the strains persisted.

"4. The Brazilian strain tolerated anaerobiosis for shorter periods than did the Venezuelan one. This difference appeared to be due to the lower polysaccharide levels maintained by the Brazilian snails on the normal diet. Increasing the polysaccharide level did not change the anaerobic survival of the Venezuelan snails, but it increased that of the Brazilian snails to approximately the same period as that shown by the former."

STIREWALT, M. A. **Effect of Snail Maintenance Temperatures on Development of *Schistosoma mansoni*.** *Exper. Parasit.* New York. 1954, Nov., v. 3, No. 6, 504-16, 5 figs.

"The snail *Australorbis glabratus* was maintained at 23 to 25°C, 26 to 28°C, 31 to 33°C, 33 to 35°C, and 36 to 38°C after exposure either to one or to five miracidia of *Schistosoma mansoni*. Several phases of the host-parasite relationship were influenced by temperature changes.

"(1) The proportion of snails in which infections developed to cercarial production was reduced from an average of 78% infected from five miracidia and 35% from one miracidium among snails kept at 26 to 28°C to an average of 59% and 9%, respectively, from snails at 23 to 25°C, after several consecutive sub-passages of the schistosomes at these temperatures. During the first snail passage of the parasite at 23 to 25°C, the infection rate from one miracidium was 27%, and at 31 to 33°C, 52%. Mortality in snails made the use of higher temperatures impractical.

"(2) It is believed that continuous low temperature passage of the schistosome in snails results in low cercarial production by the sporocysts, though proof is not presently available. Indications were that even during the first low temperature snail passage of the parasite, cercarial production was suppressed to a limited extent.

"(3) The prepatent period was lengthened as the snail maintenance temperatures were lowered: at 31 to 33°C, it was 18 days; at 26 to 28°C, 22 to 23 days; and at 23 to 25°C, 35 to 56 days. Many snails lost their infections within several months after exposure when they were kept at the low temperature. Loss of infection was encountered in only two snails at the higher temperatures, and that occurred over a year after exposure.

"(4) Cercariae which developed from sporocysts after several sub-passages in snails at 23 to 25°C were low in their infectivity for mice as shown by their poor penetration and maturation into adult schistosomes."

LUTTERMOSER, G. W. **Studies on the Chemotherapy of Experimental Schistosomiasis. III. Harvest of *Schistosoma mansoni* Cercariae by Forced Nocturnal Emergence from *Australorbis glabratus*.** *J. Parasitology.* 1955, Apr., v. 41, No. 2, 201-8, 1 fig.

It is well known that the cercariae of *Schistosoma mansoni* under normal laboratory conditions emerge from the molluscan host *Australorbis glabratus* in greatest numbers between the hours of 9 a.m. and 2 p.m. KUNTZ [this

Bulletin, 1947, v. 44, 330] showed that exposures to strong artificial light (100 watt bulb) and a raised temperature (35°-37°C.) increased the output; while other workers, notably OLIVIER [J. Parasit., 1951, v. 37, 201-204] demonstrated that by inverting the light-cycle certain species of cercariae showed a complete inversion of periodicity of emergence.

The experiments described in the present paper were undertaken to provide a means of obtaining a maximum yield of infective cercariae which were required for chemotherapeutic studies.

The author's summary is as follows:—

" 1. A study was made of the daily and weekly yields of *S. mansoni* cercariae from the snail *A. glaberratus* which had been exposed to 5 or 10 miracidia each on the same day.

" 2. Under conditions of constant temperature of 30°C., isolation in fresh water, and alternation of artificial light with darkness every 12 hours, large numbers of cercariae escaped from individual snails during the periods of light every second or third day, while emergence from groups of snails rose daily during the periods of light. With the inversion of the 12-hour light cycle, the pattern of emergence became reversed.

" 3. The number of cercariae which emerged upon weekly isolation of a group of snails in fresh water in darkness at room temperature for 6 hours was usually limited; however, cercarial emergence increased immediately when the snails were exposed to light and a change of temperature from 24-26°C. to 28-30°C.

" 4. Snails which had previously been infected with 10 or more miracidia likewise yielded cercariae upon weekly exposure to artificial light and increase in temperatures of 2-6°C. either from 9 A.M. to 3 P.M. or from 3 A.M. to 9 A.M. The cercariae emerging during both exposures were equally infective to mice.

" 5. Emergence was forced during the hours from 3 A.M. to 9 A.M. by placing snails in a box with automatic light control the evening before. This method was found practical for obtaining sufficient cercariae for heavy exposure of many animals the same day."

[The information contained in this interesting paper should be of value to workers studying the chemotherapy of schistosomiasis in experimental animals and should be consulted by them in the original for details of the various techniques used.]

R. M. Gordon

PIFANO C., F. La resistencia del huésped vertebrado a las re-infecciones por el *Schistosoma mansoni*. [Resistance of the Vertebrate Host to Reinfections with *Schistosoma mansoni*] Reprinted from *Rev. Sanidad y Asistencia Social*. Caracas. 1953, Sept.-Dec., v. 18, Nos. 5/6, 767-81. [15 refs.]

The English summary appended to the paper is as follows:—

" The resistance of the vertebral host to reinfections produced by man-parasiting Schistosoma species, has been suspected since many years ago, and such possibility is proved by existing experimental papers.

" The present communication supports itself on research carried out with 25 guinea pigs that were reinfected with *Schistosoma mansoni* cercaria eight to twelve months after the original infections by the same parasite.

" As a comparative study, some guinea pigs without previous Schistosomal infection, were infected with the cercaria used in the reinfections.

" The registry analysis demonstrates that reinfection cercaria originates very slight schistosomal infections with worms incompletely developed that do not attain sexual maturity.

"The reinfections do not increase the number of small eggs deposited in the liver and intestinal wall (rectum).

"In twelve out of sixteen animals (75%), eggs were scarce comparatively with some animals that were infected only with the same cercariae employed in reinfections.

"It seems as though reinfections while increasing the host's humoral resistance, inhibit egg laying and therefore decrease the amount of small eggs deposited on the tissues.

"In most of the animals the Vogel-Manning's Cercaria Reaction was made during evolution of Schistosomiasis.

"There seems to be evidence that while the reaction progressively develops its positivity, reinfections become more difficult and worms get to portal circulation in scarce quantity without acquiring sexual maturity."

LATTY, S. G., Jr., HUNTER, G. W., MOON, A. P., SULLIVAN, B. H., Jr., BURKE, J. C. & SPROAT, H. F., with the technical assistance of J. S. WILLIAMS, D. E. POTTS & M. G. RADKE. *Studies on Schistosomiasis. X. Comparison of Stool Examination, Skin Test, Rectal Biopsy, and Liver Biopsy for the Detection of Schistosomiasis mansoni. Gastro-enterology.* 1954, Sept., v. 27, No. 3, 324-33, 4 figs. [24 refs.]

"One hundred and seven asymptomatic Puerto Rican soldiers were examined for schistosomiasis mansoni by a rectal biopsy and by two stool concentration methods, the AMS III (hydrochloric acid-sodium sulfate-Triton-ether) and the MGL (formalin-ether), on three separate stool specimens.

"Eggs of *S. mansoni* were demonstrated in 42 patients. Six patients were positive by stool examination alone and three patients were positive by rectal biopsy only. Since no single method revealed all positive cases, it is recommended a rectal biopsy be performed following negative stool examination by the AMS III method where schistosomiasis mansoni is suspected.

"There were 13 false negative reactions to a skin test performed on 88 of these patients.

"Liver biopsy of 29 patients demonstrated to harbor *S. mansoni* eggs was normal in 15; 14 specimens showed a granuloma, and eggs or the remnants of eggs were demonstrated in 10."

STIREWALT, M. A. & EVANS, A. S. *Serologic Reactions in Schistosoma mansoni Infections. I. Cercaricidal, Precipitation, Agglutination, and CHR Phenomena. Exper. Parasit.* New York. 1955, Mar., v. 4, No. 2, 123-42, 4 figs. [15 refs.]

This paper brings up to date and amplifies our knowledge of the serological reactions likely to be observed in human or animal infections caused by *S. mansoni*.

The authors' summary is as follows:—

"Cercariae of *Schistosoma mansoni* were observed in sera from uninfected hamsters, mice, rats, rabbits and guinea pigs, and from *S. mansoni*-infected hamsters, mice and rats.

"1. All sera from rats, rabbits and guinea pigs were strongly cercaricidal. Mouse and hamster sera were essentially non-cercaricidal.

"2. Precipitate formation usually accompanied cercaricidal activity.

"3. Cercaricidal activity and precipitate formation did not appear to be related to schistosome infection in these hosts.

" 4. All the infected host sera were CHR [*cercarien hüllenreaktion*] positive, cercaricidal sera, however, only after heat-inactivation.

" 5. Agglutination has been related to stickiness either of orally secreted material or of slowly developing membranes.

" 6. CHR or pericercarial membrane formation was an acquired reaction to the presence of either sex of living worms or schistosomula in the mice, rats, and hamsters studied. It was not completely thermostable, but was storage stable. It was found only around living cercariae. Cercarial exhaustion with respect to the CHR was demonstrated, but serum exhaustion was not.

" 7. Possible diagnostic value of the CHR in unisexual or latent infections is suggested ". [These results generally confirm the claims made by VOGEL and MINNING (this *Bulletin*, 1949, v. 46, 1154; 1950, v. 47, 635) regarding the value of the CHR, or " pericercarial membrane phenomenon " as a laboratory method of diagnosing *S. mansoni* infections.]

R. M. Gordon

ELIAKIM, M. & DAVIES, A. M. **The Complement-Fixation Test in Bilharziasis. II. Preparation and Preservation of Antigens from *Schistosoma mansoni* Worms extracted in Coca's Solution.** *Parasitology*. 1955, May, v. 45, Nos. 1/2, 189-94.

" 1. Adult *S. mansoni* worms were extracted in Coca's solution at various temperatures by different methods. The most potent antigen was obtained by extracting a worm suspension, diluted 1:500, at 37°C. for 1 hr., with vigorous shaking at 10 min. intervals, followed by 23 hr. at 28°C. Second extraction of worm samples gave highly active material and third extractions also contained antigen.

" 2. Complement-fixation tests, performed with the sera of twenty-five patients with chronic bilharziasis and twenty-five healthy subjects showed that the most specific results were obtained with either the first two extracts of worms, suspended in 100 parts of Coca's solution, and extracted for 1 hr. at 37°C. and 23 hr. at 28°C., or with the first extract of worms suspended in 500 parts and extracted in the same manner.

" 3. Samples of an extract in Coca's solution were preserved for 170 days by different methods, and their activity was tested at approximately monthly intervals. The antigen, with or without the addition of 0.1% cysteine, retained its titre for 1 month, when kept in the refrigerator. Freezing, or lyophilization of the extract caused a rapid drop in titre.

" 4. Titration of extracts of lyophilized worms, from freshly opened ampoules, showed that a constant titre was retained for 3½ months followed by a slight drop after 5-6 months. The worm powder retained its antigenic potency when kept, thoroughly desiccated, in the refrigerator for 4 months, but lost it in 40 days when partial rehydration occurred."

FIORILLO, A. M. Estudo eletroforético de sôro de pacientes portadores de esquistossomose mansoni hepato-esplênica. [Electrophoretic Study of the Serum of Hepato-Splenic Manson's Schistosomiasis Patients] Hospital. Rio de Janeiro. 1954, May, v. 45, No. 5, 647-51, 2 figs.

The English summary appended to the paper is as follows:—

" The author presents the electrophoretic pattern of 10 cases of Schistosomiasis mansoni with hepato-splenomegaly. The electrophoretic determinations were done with filter paper by the Grasmann method. Every case was found low in albumin and β globulin and γ globulin was always

much increased; a sharp separation between β globulin and γ globulin spikes were not seen. The correlation between the cephalin-cholesterol flocculation and the formol-gel tests and the electrophoretic pattern was studied. The author also concluded that the pattern obtained is equal to the one of Laennec's cirrhosis.

"The author suggested further studies on the subject."

DEJOU, L. & NAVARRANNE, P. Aspects chirurgicaux de quelques localisations abdominales des bilharzioses (*Schistosoma haematobium* et *mansonii*). [Surgical Aspects of Abdominal Schistosomiasis (*haematobium* and *mansonii*)] *Méd. Trop.* Marseilles. 1954, Sept.-Oct., v. 14, No. 5, 513-41, 3 figs. (2 on 2 pls.). [79 refs.]

The authors survey systematically, with much reference to the literature, the various intra-abdominal manifestations of schistosomiasis, after a preliminary section dealing with the natural history of the parasite, its distribution within the human body and the method of finding the ova by digestion of the tissue in 10 per cent. caustic potash prior to microscopical examination. Using this method, GELFAND in Rhodesia [this *Bulletin*, 1942, v. 39, 699] found 98 per cent. infection in 150 subjects; he has found ova in the bladder wall when cystoscopy has been negative and in the female genital organs when clinically they appeared normal. The tissue reaction to the worm and its ova comprises inflammatory granulation tissue, with excess of eosinophils, with papillomata on the surface, leading to fibrosis and eventually calcification after death of the eggs, or malignant change.

Schistosomiasis may interfere with the operative treatment of vesico-vaginal fistula, the fibrosis preventing closure of the fistula and uretero-sigmoid implantation, hence anti-schistosomal treatment should be given before operation. Stenosis of the ureteric orifice, leading to grave renal damage, can be detected by intravenous urography, though the blood urea may be normal. Sclerosis around the neck of the bladder may cause retention and call for resection of the obstructing tissues. Calcification of the bladder walls, illustrated by 2 plates, may involve the lower parts of the ureters, seminal vesicles, prostate and even the rectum; ova are usually absent in the calcified walls of the bladder, but stones tend to form in the cavity, with masses of ova as nuclei. The transformation of the papillomata into cancer is frequent; in Egypt cancer of the bladder is said to be 11 times more frequent than in other countries. Infiltrations in the urethra may lead to fistulae and to an elephantoid condition of the perineum, scrotum and penis.

Gelfand in Rhodesia [this *Bulletin*, 1950, v. 47, 903] found in a series of autopsies on schistosomal subjects dying of intercurrent disease that the female genital tract was involved in 80-90 per cent. of cases, without necessarily causing any symptoms. Involvement of the vulva manifests itself as an inflammatory swelling, with nodules beneath the skin, which progress to a papillomatous formation extending outwards to the crural regions and backwards to the anus, eventually ulcerating; the differential diagnosis from cancer, syphilis, tuberculosis or lymphogranuloma depends on biopsy and the finding of schistosomal ova. Involvement of the vagina and cervix gives rise to fungating tumours, with pain, pruritus and profuse sanguineous discharge; the diagnosis from cancer of the cervix requires biopsy. The endometrium of the uterus is rarely affected and ova are difficult to find; by contrast the myometrium is more frequently infected, the uterus being enlarged with soft, pedunculated or sessile tumours either localized or diffuse. The ovaries and tubes, when involved, become imbedded

in a fibrous mass, with adhesions to neighbouring organs, though the lumen remains patent; ova of *Schistosoma* with eosinophil reaction are found in all layers of the walls of the tubes. The ovaries may be sclerosed with granulations on the surface or may be cystic, they may function normally or be sterile. Schistosomiasis attacks children very frequently and is said to lead to the late onset of menstruation, due to ovarian fibrosis.

When the epididymis is attacked the head becomes enlarged and bossy, burying the testis, which appears normal except for some atrophy. Young adults are attacked and the only symptom is a sense of weight in an enlarged scrotum, so that the clinical picture is strikingly like that of tuberculous epididymitis, especially as it is accompanied by nodules in the cord and seminal vesicles; biopsy will make the diagnosis clear. The seminal vesicles were found to be infected in 80 per cent. of cases of vesical schistosomiasis, the prostate in 19 per cent. [MOHAMMED, this *Bulletin*, 1953, v. 50, 427]; the first clinical sign is often haemospermia and in this stage ova may be present in the semen. In later stages fibrosis obstructs the duct and causes sterility. The prostate is less often attacked, the pathological changes are the same as elsewhere and the clinical symptoms are the same as those of hypertrophy of the prostate.

Infection of the peritoneum may clinically resemble tuberculous peritonitis with ascites; as the ova are not at first present in the stools diagnosis can only be made on laparotomy. Schistosomal masses are commonly met with in the sigmoid colon and rectum, more rarely in the caecum and appendix; they consist of polyps, ulceration and sclerosis with much retrocolic fibrosis, which may cause obstruction. Ova have been found in the walls of the appendix, but cause no special symptoms, though occasionally mucosal necrosis may lead to acute appendicitis or perforation. Rectal stenosis in schistosomiasis patients, with ova in the stools, is more common in females, but it is doubtful if schistosomiasis is the cause, as clinically the condition resembles lymphogranuloma and responds to treatment for that condition.

Ova have been found in the pus of liver abscesses and in biliary calculi, in the pancreas and in skin.

It is emphasized that schistosomiasis of the abdominal organs may mimic tuberculosis by its granulations, cancer by tumour and ulceration and infections by necrosis and fibrosis. Biopsy is the only certain method of diagnosis in such cases.

W. L. Harnett

GHEITA, A. **A Surgical Conception of Sigmoid Bilharziasis.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 2, 102-9, 3 figs.

Schistosomiasis of the sigmoid colon is very common in Egypt. The symptoms in the cases treated by the author [which are presumably advanced] were (1) abdominal colic, not accompanied by vomiting; (2) passage of fresh, bright-red blood per rectum; (3) dysenteric symptoms, with tenesmus and mucus in the stools; (4) dyspepsia, especially after fatty food; (5) loss of weight and asthenia; (6) intestinal obstruction sufficient to cause distension and hypertrophy of the muscular layers of the bowel; (7) tumour in the left iliac fossa, usually fixed, firm and irregular, not tender, and not responding to antibiotics or to anti-schistosomal treatment. The tumour may suggest a sigmoid carcinoma, but the latter is usually a small, atrophic lesion, whereas a schistosomal tumour is hypertrophic, obstruction occurs early in cancer and the history is short; in schistosomiasis sigmoidoscopy shows papillomata and ulcers and an X-ray after a barium enema shows a honeycomb appearance. At abdominal exploration the gut is found to be extensively involved in schistosomiasis, whereas in carcinoma

the lesion is more localized. Fixity of the tumour with shortening of the mesosigmoid and subserous infiltration, enlargement of the lymph nodes of inflammatory type and hypertrophy of the appendices epiploicae all point to schistosomiasis rather than to cancer, as also does the feeling of worm-like masses inside the colon, due to the papillomata.

Indications for operation are marked constitutional disturbance, the failure of medical treatment to give relief and pronounced intestinal stasis. The operation is difficult, on account of the extensive resection required and because of adhesions with thickening and shortening of the mesosigmoid. After pre-operative treatment with antibiotics, colonic washes and blood transfusion, primary resection-anastomosis, preceded by thorough mobilization of the descending colon up to the splenic flexure, and without colostomy, is advised. An X-ray with barium enema taken one month after operation may show a few polyps still present at the line of anastomosis; these can if necessary be destroyed by cautery through the sigmoidoscope. The patients usually put on weight rapidly after operation and the haemoglobin level rises.

Pathological examination of the specimen shows that all layers of the bowel are involved, secondary infection causes oedema of the tissues and massive invasion of the lymph nodes produces an elephantoid condition of all the structures.

[The author does not say on how many cases this study is based.]

W. L. Harnett

RAISON, C. G. & STANDEN, O. D. **The Schistosomicidal Activity of Symmetrical Diaminodiphenoxylalkanes.** *Brit. J. Pharmacol. & Chemotherapy.* 1955, June, v. 10, No. 2, 191-9, 2 figs. [14 refs.]

This paper describes an investigation of the action of a new series of compounds upon *Schistosoma mansoni* maintained in mice in the laboratory and also upon *S. japonicum* in guineapigs. (A preliminary note was published in *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1954, v. 48, 446.) The compounds have the basic formula



where R_1 etc. are alkyl groups. In the present series $R_1R_2=R_3R_4$. Over 300 of these compounds have been found to be active, some of them being 7-10 times as active as tartar emetic and 9 times as active as lucanthone (Miracil). They were active upon both species of schistosome. The action of these compounds upon schistosomes appears to be more fundamental than that of antimonials and lucanthone, since worms are less able to recover from the effects of treatment. The most active compound appears to be 413C52 in which $n=7$ and R_1 and $R_3=H$ and R_2 and $R_4=CH_3$. [Most of this paper is devoted to a detailed analysis of the relation between chemical structure and antischistosomal activity, for which the original should be consulted. Application of these compounds to human therapy has been handicapped by the appearance of a toxic action upon the eyes; nevertheless they have great interest and potential importance.]

F. Hawking

LEIGH, W. H. **The Morphology of *Gigantobilharzia huttoni* (Leigh, 1953) an Avian Schistosome with Marine Dermatitis-producing Larvae.** *J. Parasitology.* 1955, June, v. 41, No. 3, 262-9, 7 figs. on pl. [26 refs.]

"Pigeons, young chicks and parakeets were exposed to *Cercaria huttoni* Leigh, 1953, a dermatitis producing cercaria from the marine snail

Haminoca antillarum guadalupensis collected at Virginia Key, Florida. Parakeets serve as adequate experimental hosts; pigeons and chicks were negative on examination. This schistosome species belongs to the genus *Gigantobilharzia* and the adult is confined to minute veins in the wall of the intestine. Oval unspined eggs passed in the feces hatch normally. The natural host of this parasite is unknown."

MINNING, W. & FUHRMANN, G. Protein-, Kohlehydrat- und Lipoid-Fraktionen von *Fasciola hepatica* als KBR-Antigene. [Protein, Carbohydrate and Lipoid Fractions of *Fasciola hepatica* as Antigens in Complement-Fixation Tests] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1955, Apr., v. 6, No. 1, 92-9.

The English summary appended to the paper is as follows:—

"An extract of the parasite as a whole is generally used as antigen in the complement fixation test for *Fasciola hepatica*. It seemed worthwhile to study the action of partial antigens derived from protein, carbohydrate and lipoid fractions of the parasite substance against sera of humans and animals carrying fasciola or other trematode infections.

"Protein antigen gave weaker reactions than whole antigen in fasciola infections. Schistosome infections of humans and monkeys sometimes gave positive tests with the protein antigen but negative tests with the whole antigen. Clonorchis cases reacted negative with both antigens.

"The extract of the carbohydrate fraction did not show antigenic qualities in fasciola or schistosome or clonorchis infections, neither did it provoke antibody formation.

"The total lipoid fraction extracted by chloroform acted weakly against fasciola and proved negative in related trematode infections.

"The authors conclude that alcoholic extracts of the whole fasciola worm still are the best antigens to prove fasciola antibodies by the complement fixation test."

BICKERSTAFF, E. R. **Cerebral Cysticercosis. Common but Unfamiliar Manifestations.** *Brit. Med. J.* 1955, Apr. 30, 1055-8. [19 refs.]

Epilepsy is looked upon as the classical neurological manifestation of cerebral cysticercosis, but there are many common manifestations that are not generally recognized as such. Further, it is common to associate cysticercosis with residence in India or the Far East, but there are many other countries in which it is common.

The principal manifestations in the 7 cases reported were: disordered behaviour in 2 cases, in one of which the attacks were followed by a period of unconsciousness; transitory pareses in 2 cases with temporary aphasia in one; in 2 cases sudden attacks of headache, vomiting, tinnitus and giddiness which were sometimes followed by coma that in one case resulted in death, a condition suggesting acute intermittent obstructive hydrocephalus; and failing of vision in one patient who had previously had fits. Other symptoms that were noted in several of these cases were attacks of dysequilibrium and involuntary movements.

Hitherto insufficient attention has been paid to cerebro-vascular lesions. Histological studies have shown periarteritis and endarteritis as of constant occurrence in the vicinity of the cysts; many both permanent and transient symptoms are probably due to ischaemic lesions.

The diagnosis in 5 of the cases was made by X-ray of the thigh muscles, but in only one was there any X-ray evidence of cysticerci in the brain; in 2 of these cases the diagnosis was confirmed by biopsy of subcutaneous nodules.

One patient who came to necropsy showed a solitary cysticercus impacted in the fourth ventricle as well as others elsewhere in the brain, and in another in whom the posterior fossa was explored surgically a racemose cysticercus was found. The latter condition was also suspected in another case; the importance of making a diagnosis of this specific condition is that surgical intervention offers some hope of success.

[This is an important paper.]

L. E. Napier

LIE KIAN JOE, GUPITO, C. & HANJOJO, K. **A Case of Cysticercosis in Indonesia.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 134-5, 1 fig.

"A case of cysticercosis of the brain in a Chinese female is reported; this is the second case of cysticercosis recorded in Indonesia."

[See this *Bulletin*, 1950, v. 47, 766.]

HOWDEN, P. F. **Hydatid Cyst of the Lung.** *New Zealand Med. J.* 1955, Apr., v. 54, No. 300, 197-202.

"Thirty-one patients with hydatid cysts of the lung have been described. Their presenting signs and symptoms have been discussed and the various operative procedures performed and commented upon.

"Forty operations in all were carried out. On nine patients more than one operation was required. Removal of the cyst membrane with primary closure of the cyst space was performed in twelve patients and found to be most satisfactory.

"The post-operative complications are presented. The stay in hospital varied from ten to forty-two days. The types of operations performed are discussed."

CHIGNOLI, V. & TRIGGIANI, L. **Sulla diffusione delle parassitosi intestinali in collettività infantili.** [The Spread of Intestinal Parasites in Children's Communities] *Igiene e San. Pubblica.* Rome. 1954, Nov.-Dec., v. 10, Nos. 11/12, 693-8. [12 refs.] English summary (4 lines).

The authors have examined specimens of stools from a total of 812 child inmates, 412 being from Homes in Nola, 250 from a trachoma colony in Capodimonte (Naples) and 150 from a summer colony in Baia. The material was obtained by the use of glass rods one end of which had been moulded into the shape of a small spoon so as to make a blunt curette with which to scrape the margin of the anus. Only one specimen was taken and examined from each child. Willis's enrichment technique was applied.

Eggs of *Ascaris lumbricoides* were found in 26.6 per cent. of the children examined, of *Trichuris trichiura* in 24.1 per cent., of *Enterobius vermicularis* in 30.8 per cent. and of *Hymenolepis nana* in 12.5 per cent., the last helminth being limited to the cases from Nola, in which district the species is known to be prevalent in children. There was a helminthiasis in 48.2 per cent. of all the children examined, many being infested by 2 or 3 species.

Treatment is advisable in all cases found, even though no signs or

symptoms seemed to be evident in most of the infestations with *H. nana*. The authors believe that this species was brought into Italy by coloured troops with the invading and occupying forces in World War II.

The authors consider that children should be examined and treated for intestinal parasites at the time of admission into nurseries, colonies or other communal homes.

J. Cauchi

GALLO, G. Le parassitosi intestinali in provincia di Salerno. [Intestinal Parasite Infection in the Province of Salerno] *Igiene e San. Pubblica*. Salerno. 1953, Mar.-Apr., v. 9, Nos. 3/4, 228-35, 1 chart.

The English summary appended to the paper is as follows:—

“Basing himself on the results obtained during the period 1941-1952 by the Provincial Laboratory for Hygiene and Prophylaxis, Salerno, from 6000 fecal specimens according to the notifications filed with the Provincial Public Health Department, the author exposes data upon the spreading of the principal intestinal parasitic diseases.

“This investigation has shown the marked diffusion of hookworm disease and the necessity of a general effective plan for controlling the helminthiasis in question.”

VENDRAMINI, R. & MAGAUDDA-BORZÌ, L. Proposta di una reazione intradermica per la diagnosi di massa dell'ankylostomiasi. [An Intradermal Reaction for the Mass Diagnosis of Ankylostomiasis] *Nuovi Ann. d'Igiene e Microbiol.* 1955, Mar.-Apr., v. 6, No. 2, 81-9, 2 figs.

The antigen is prepared as follows:—

Adult hookworms are recovered from the faeces of suitable subjects after treatment with a mixture of 25 gm. castor oil and 4 cc. chloroform. The worms are washed several times in saline and placed in a mortar in a desiccator over calcium chloride. After about one hour they can be titrated to a fine powder, which is left in the desiccator.

A weighed quantity of the powder is covered with 95 per cent. alcohol in a flask plugged with cotton and placed at 37°C. until the alcohol is evaporated. The dry antigen is treated with sterile saline to the required proportion (1 mgm. of the dry substance to 1 ml. saline) and after being stored at 5°C. for 48 hours, the fluid is centrifuged at 2000 r.p.m. The supernatant fluid is submitted to aerobic and anaerobic culture, and is the antigen. It is stored at 5°C. Further dilutions are made. The intradermal dose is 0.1 cc., and a control injection of saline is given.

A positive result is indicated by blanching of the skin and a surrounding erythema of diameter 1-5 cm. within 10-20 minutes. False positive reactions may occur with the higher concentrations, and the authors, after numerous tests, finally adopted a dilution of 1 in 450,000 as standard.

Results are indicated by the authors' summary in English:—

“The authors have exactly specified allergical reaction for the mass diagnosis of ankylostomiasis. They expose the technical proceeding for the production of the antigen and a first series of results. From these it appears that the reaction is a positive one in 98 per cent. of the infested persons and falsely positive in 11.50 per cent. of the healthy individuals.

“According to the authors, when these percentages may find a confirmation through investigations on a larger scale, the reaction in question may be of great value in the epidemiological surveys of the spreading of ankylostomiasis among the farm-labourers.”

Charles Wilcocks

LOEWENTHAL, L. J. A. **Evaluation of Therapy in Creeping Eruption.** *Australian J. Dermat.* 1954, Dec., v. 2, No. 4, 171-8, 3 figs. [24 refs.]

The existence of a large number of remedies in common use argues against the efficacy of any of these and therapeutic successes must be subjected to very careful scrutiny. Many physical and biological processes show a phenomenon known as the "die away curve". Newton's "law of cooling", unimolecular reactions, and the dying off of various populations are a few phenomena that obey a basic formula and their curves, derived from this formula, all follow a similar shape.

In a series of 40 patients suffering from creeping eruption treated by various methods the life span of 96 larvae was observed. Spontaneous cure accounted for one-third of the recoveries. A survivors' curve was then plotted for the 96 larvae, no larva being considered dead until all movement had ceased for 6 weeks. This conformed with the traditional pattern of all survivors' curves and when the logarithms of the survivors were plotted against the time elapsed the result was approximately a straight line, showing that the curve was essentially logarithmic. It thus seems that larvae, whether dying spontaneously or exposed to a variety of therapeutic measures, appear to die in conformity with a general law of nature applicable to any population subjected to the action of unfavourable environment. There is little evidence that present-day methods of systemic therapy provide a less favourable environment for the larvae than does normal human skin.

H. T. H. Wilson

OSHIMA, T. **Analysis of Seasonal Ascarids Incidence—an Hypothesis.** *Bull. Tokyo Med. & Dental Univ.* 1954, Nov., No. 2, 105-11, 2 figs.

"1. The discovery of Ascaris ova in the feces after infection delays with certain time relation.

"2. 'The time duration from the infections of Ascaris to the discovery of ova in the feces, follows normal distribution, in which mean value (m) is about 3.0 and standard deviation (s) is about 1.0' is introduced hypothetically in this paper.

"3. The computed values from this hypothesis show nearly the same value of practical data, and the hypothesis has some grade of reliability."

POLLAK, J. K. & FAIRBAIRN, D. **The Metabolism of *Ascaris lumbricoides* Ovaries. I. Nitrogen Distribution.** *Canadian J. Biochem. & Physiol.* 1955, May, v. 33, No. 3, 297-306. [50 refs.] **II. Amino Acid Metabolism.** *Ibid.*, 307-16, 1 fig. [17 refs.]

SPRENT, J. F. A. **On the Invasion of the Central Nervous System by Nematodes. I. The Incidence and Pathological Significance of Nematodes in the Central Nervous System.** *Parasitology.* 1955, May, v. 45, Nos. 1/2, 31-40. [Numerous refs.]

This paper is essentially a review of the literature concerning (A) the incidence and (B) the pathological significance of nematodes in the central nervous system. (A) *Incidence.* Although nervous symptoms have frequently been associated with nematode infections in man and animals, in relatively few instances have the worms been recorded from the central nervous system. In instances where their identity was established the

adult or larval forms were found to belong to one of the following superfamilies:—Ascaridoidea, Filarioidea, Trichuroidea, Strongyloidea, Metastrongyloidea, Rhabditoidea or the family Dioctophymatidae. In addition, the literature contains a few records of unidentified nematodes having been found in the central nervous system. The parasites may be located in the meningeal spaces, or in the tissues of the brain and spinal cord.

(B) *Pathological significance.* (1) *Effects due to nematodes situated outside the central nervous system.* There is at present no satisfactory explanation for the nervous symptoms associated with the presence of intestinal nematodes. What evidence there is suggests that the ill effects produced are the result of a previous sensitization and are not caused by the release of toxins from the worms. (2) *Direct effects.* The direct pathological effects on the central nervous system are mainly the result of trauma and are directly proportional to the size and activity of the parasite. The lesions produced may include haemorrhage, degenerative changes, cellular infiltration and glial proliferation. They may be diffuse or focal and may or may not be observed in close association with the parasite. (3) *Transportation of viruses into the central nervous system.* The literature contains evidence that nematode larvae may carry viruses from one host to another and it is, therefore, likely that nematode larvae entering the central nervous system may facilitate its invasion by viruses present in other parts of the body [see this *Bulletin*, 1952, v. 49, 529, 1187].

R. M. Gordon

SPRENT, J. F. A. *On the Invasion of the Central Nervous System by Nematodes. II. Invasion of the Nervous System in Ascariasis. Parasitology.* 1955, May, v. 45, Nos. 1/2, 41-55, 5 text figs. & 18 figs. on 2 pls. [13 refs.]

In his review of the literature [the reference to which should read "Sprent 1955" not "Sprent 1954"] just referred to, the author drew attention to the fact that previous authors had observed the invasion of the central nervous system by various species of nematodes. In the present paper, he records certain observations on the distribution, mode of entry, development and pathological significance of the larvae of various ascaridid species in the central nervous system of mice. Mice were infected by feeding them with material containing embryonated ascaridid eggs by means of the method described by the author in a previous paper [this *Bulletin*, 1952, v. 49, 786]. After a selected incubation period, the mice were killed and the brains macerated in a Waring blender and then digested at 37°C. with 50 ml. physiological saline and 0.025 gm. trypsin for 3 hours at pH 7. For histological study the brain was fixed in Helly's fluid and stained with haematoxylin and eosin. Other animals were infected by mixing the eggs with the normal food. Their brains and other tissues were digested with pepsin (1 gm./100 gm. brain) at pH 1 for 12-18 hours. The sediment was resuspended in 250 ml. physiological saline and left to stand for $\frac{1}{2}$ hour. This was repeated several times until the supernatant was clear. Four series of mice were used in the investigation. In the first series there were 9 groups of 13 mice; each group was infected with 2,500 eggs of one of the following species: *Ascaris lumbricoides*, *A. suum*, *A. columnaris* (from skunk), *A. devosi*, *Toxocara canis*, *T. mystax*, *Toxascaris leonina*, *T. transfuga* and *Parascaris equorum*. One mouse from each group was killed on each consecutive day up to 13 days after infection. A second series of mice containing 4 groups was infected with 2,000-3,000 eggs of *A. devosi*, *T. transfuga*, *T. mystax* and *T. canis* respectively. The mice were killed on consecutive days after infection up to 14 days. A third series of mice

containing 5 groups was infected with 2,000-3,000 eggs of *A. columnaris*, *A. devosi*, *T. transfuga*, *T. mystax* and *T. canis* respectively. The mice in each group were killed at 3 and 4 weeks, and thence at monthly intervals up to 6 months after infection. A fourth series of mice was infected with 5,000 eggs of *T. canis*; one mouse was killed each day after infection.

The results obtained from the experiment and the conclusions reached are summarized by the author as follows:—

“ 1. Experimental infections in mice showed that the larvae of *Toxocara canis*, *T. mystax*, *Ascaris devosi*, *A. columnaris* and *Toxascaris transfuga* reached the brain of mice; the larvae of *Ascaris lumbricoides*, *A. suum*, *Parascaris equorum* and *Toxascaris leonina* were not recovered from the brain. The larvae of *T. canis*, *T. mystax*, *T. transfuga* and *A. columnaris* remained in the brain of mice for several months.

“ 2. Larvae reaching the brain produced characteristic haemorrhages on the surface of the cerebral hemispheres in the early stages of infection. It was concluded that the larvae reach the brain via the arterial blood stream, leave the arteries at the point where their diameter approximates that of the larvae, *i.e.*, mostly on the surface of the brain, and penetrate into the brain from the subarachnoid space and chorioidal tissues.

“ 3. The larvae of *T. canis* were found to occur in the brain of mice in relatively greater numbers than the larvae of other species, but only very rarely caused nervous symptoms. The larvae of *T. canis* and *T. mystax* showed no growth in the brain.

“ 4. The larvae of *A. columnaris* (skunk) frequently caused nervous symptoms in mice, the effect appeared to result from traumatic damage due to the relatively large size attained by these larvae about 3 weeks after infection.

“ 5. The brain of infected mice showed very slight changes consequent upon infection with larvae of *T. canis*. These larvae moved actively through the tissues; they incited little or no cellular reaction, but left haemorrhagic tracks. The larvae of *A. columnaris* also moved actively; when in the extended state they were usually found in normal tissue; when coiled, they were often associated with a necrotic focus infiltrated with leucocytes.

“ 6. After experimental infections of dogs with larvae of *T. canis*, two out of twelve infected animals harboured larvae in the brain. No natural infections with these larvae were found in the brains of dogs and cats. After experimental infection, larvae of *T. canis* were found in the brain of mice, rats and guinea-pigs, but not of rabbits.

“ 7. Larvae of *A. suum* were recovered from the cerebrum of one pig suffering from posterior paralysis, but not in an experimentally infected pig.

“ 8. No larvae of *P. equorum* were found in the brain of foals in natural and experimental infections.”

R. M. Gordon

GROSS, R. & SCHMIDT, G. H. H. Über die Relativität des Antagonismus zwischen Corticoiden und Bluteosinophilen. [The Relativeness of the Antagonism between Adrenal Cortical Hormones and Eosinophil Leucocytes] *Klin. Woch.* 1954, Mar. 15, v. 32, Nos. 11/12, 245-8, 2 figs. [24 refs.]

The object of this paper is to show that the effect of corticotrophin and cortisone in reducing the number of eosinophil cells in the blood is only relative. In conditions leading to eosinophilia this limiting effect is affected by the severity of those conditions, and to demonstrate this point one of the authors infected himself with 200 eggs of *Ascaris lumbricoides*, a

procedure which normally produces eosinophilia. The eosinophilia was only partly checked by continuous administration of both cortisone and corticotrophin for 17 days after infection, and became quite evident as soon as this medication was stopped. Similarly, in a patient with eosinophilia (80 per cent. of 19,500 leucocytes) after radiation treatment of Hodgkin's disease, the hormone treatment somewhat reduced the eosinophil count, but only during the administration; the count rose immediately the drugs were stopped.

[The work seems to have a bearing on the Thorn test, which has been used in filariasis, see this *Bulletin*, 1954, v. 51, 299.] *Charles Wilcocks*

STANDEN, O. D. **Activity of Piperazine, in Vitro, against *Ascaris lumbrioides*.** *Brit. Med. J.* 1955, July 2, 20-22.

The worms used in these experiments were obtained from pigs and were maintained in a salt medium containing glucose buffered with phosphate at pH 8.4-8.6. For each experiment 2 male and 2 female worms were placed in a trough with 125 ml. fresh medium per worm. Piperazine as citrate, adipate or phosphate was added in various dilutions, and the medium, kept at 37°C., was changed every 24 hours, while its pH value was recorded at regular intervals. The vitality of the worms was measured by their response to tactile or light stimuli. The minimum concentrations of drug required to affect the worms were noted and also the time required for recovery when they were placed in fresh medium.

In every case the effect of the drug was first noted after 5 to 6 hours, and all movement had ceased after 24 hours. There was a slight response to tactile stimuli but none to light at this time when the dilution of drug ranged from 1 in 200 to 1 in 560. With lower concentrations of drug the effect of stimuli was more pronounced. All 3 salts of piperazine appeared equally effective and complete recovery took place in a short time in fresh medium. Even when worms appeared torpid, the pH of the medium continued to fall. These findings are discussed in relation to treatment of patients with salts of piperazine.

[In the *Brit. Med. J.*, 1955, July 16, 205, HARTLEY, in a short letter, writes on the present author's intention of providing "a means of observing any differences in efficiency of drugs (piperazine citrate, adipate and phosphate) that could be related to the varying character of the acid radical"—and explains the absence of neurotoxic effects in patients treated with the adipate.]

J. D. Fulton

MIYAZAKI, I. **Studies on *Gnathostoma* occurring in Japan (Nematoda: Gnathostomidae). II. Life History of *Gnathostoma* and Morphological Comparison of its Larval Forms.** *Kyushu Mem. Med. Sci.* Fukuoka. 1954, Sept., v. 5, No. 2, 123-40, 6 text figs. & 17 figs. on 2 pls. [22 refs.]

This paper amplifies the observations previously recorded on *G. spinigerum* in the first paper of this series [this *Bulletin*, 1955, v. 52, 565] and gives a more detailed account of the life history, including the various species of crustacea, fishes, amphibia, reptiles, birds and mammals which may be involved. The complexity of the life-cycle and the wide variety of hosts which may be involved at any stage is shown by the following quotation:

"When a crustacean host harbouring mature larvae is swallowed by a

second intermediate host, the larvae pierce the gastric wall of the latter host and enter into its muscle, where they mature to the third stage larvae in a month or more and finally encysted in a fibrous membrane. This course of infestation is called the 'primary infestation of the second intermediate host'. Experimentally three species of fish, *Ophicephalus argus*, *Mogurnda obscura* and *Misgurnus anguillicaudatus*, were subjected to this 'primary infestation' with positive results. Another course of infestation is the 'secondary infestation of the second intermediate host', which means the infestation of the host with third stage larvae of the nematode encysted in other second intermediate hosts. Up to this time the following animals, experimentally fed with the third stage larvae, have all of them been found to be infested through the course of the 'secondary infestation'.

"*Crustacea*: *Cambarus clarkii*, *Potamon dehaani*.

Pisces: *Ophicephalus argus*, *Misgurnus anguillicaudatus*, *Parasilurus asotus*, *Cyprinus carpio*, *Cyprinus auratus*, *Anguilla japonica*, Gold fish.

Amphibia: *Rana nigromaculata nigromaculata*, *Rana limnocharis*.

Reptilia: *Geoclemys reevesii*.

Aves: *Gallus gallus domesticus*, *Nycticorax nycticorax nycticorax*.

Mammalia: *Rattus norvegicus* var. *albinus*, *Mus bactrianus albula*, *Oryctolagus cuniculus* var. *domesticus*, *Mustela sibirica itatsi*, *Sus scrofa* var. *domesticus*.

"The same third stage larva can be parasitic in one after another of the above mentioned animals without making any morphological development except a slight increase in length and in colour while in *aves* or *mammalia*.

"On the other hand, as tabulated in the next chapter, 22 different species of animals, 6 of *pisces*, 2 of *amphibia*, 1 of *reptilia*, 12 of *aves* and 1 of *mammalia*, were found to be naturally infested with the third stage larvae of *G. spinigerum*.

"When these second intermediate hosts are eaten by a cat or dog, the third stage larvae penetrate the gastric or rarely the duodenal wall of the mammalian host, and entering into the liver and thence wandering through the muscle or connective tissue, grow gradually in size there. After they are almost matured, the worms enter into the gastric wall of the host from outside and make there a characteristic tumor. The eggs of the nematode appear in the faeces of the host in 100 days or more after infestation."

Much briefer accounts are given of the other two species, *G. doloresi* and *G. nipponicum*.

R. M. Gordon

JORDAN, P. Notes on Elephantiasis and Hydrocoele due to *Wuchereria bancrofti*. *J. Trop. Med. & Hyg.* 1955, May, v. 58, No. 5, 113-18. [27 refs.]

The frequency with which adult worms (*W. bancrofti*) have been found in the region of the spermatic cord, epididymis and testes, suggests that hydrocoele may be due to a local tissue reaction with the outpouring of fluid. Results of treatment with diethylcarbamazine also suggest that the reaction may be arrested as 8 out of 17 cases of hydrocoele were cured some time after the administration of this drug [this *Bulletin*, 1954, v. 51, 819]. In comparing the aetiology of elephantiasis with that of hydrocoele it is considered that both are caused by obstructions in the lymphatic drainage of the parts involved. In the case of hydrocoele it would be in the para-aortic glands and in elephantiasis of the leg in the inguinal or iliac glands. The literature is reviewed and discussed.

Philip Manson-Bahr

- i. SYMES, C. B. **Filarial Infections in Mosquitoes in Fiji.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1955, May, v. 49, No. 3, 280-82.
- ii. MANSON-BAHR, P. **Comments on Mr. Symes' Paper.** *Ibid.*, 282-4. [12 refs.]

i. Symes is interested in the possibility of controlling the filarial infection of Fiji and in trying insecticides against the mosquitoes. As a preliminary he here attempts to assess the importance of several species of these insects both by dissecting adult mosquitoes captured in houses or outside, and also by feeding bred females on infected people.

Symes has dissected about 2,300 wild mosquitoes and obtains a result which would not have been predicted. In several hundred *Culex annulirostris* and several hundred *Aëdes fijiensis* he finds a high rate of infection with nematodes of all stages, and mature or nearly mature infections in 1·3-1·9 per cent. For *Aëdes polynesiensis* and *pseudoscutellaris*, not for the moment distinguished, the total number of infections is much lower and the figure for those mature or nearly mature is 0·12 per cent.: in *Culex fatigans* the figure is also low. The author is well aware of the difficulty of identifying immature nematodes in mosquitoes but gives grounds for thinking that, though a few of the above may be *Dirofilaria immitis* derived from dogs, the great majority are to be identified as *Wuchereria bancrofti* of the non-periodic form, the only type of filaria occurring in this part of the world in man. Turning to the laboratory work in which bred mosquitoes were fed upon infected human beings and dissected after a period, one concludes that mature infections are certainly not unusual in *Culex fatigans*: their occurrence also in *A. fijiensis* and *pseudoscutellaris* is also recorded.

ii. Manson-Bahr in commenting on the communication by Symes is evidently puzzled because the conclusions run contrary to those reached by several workers in the Pacific that in Fiji and Polynesia human filariasis is transmitted almost entirely by *Aëdes pseudoscutellaris* and *polynesiensis* (which we have not been able to distinguish until quite recently): indeed there are areas in which no other mosquitoes occur though filariasis is rife. Manson-Bahr ventures to suggest a number of possible sources of error but cannot carry the matter further. He observes with justice that "Mr. Symes's results have come as somewhat of a surprise and, if his implications are correct, a reorientation of the policy of the Medical Department of Fiji regarding suppressive measures is bound to ensue". *P. A. Buxton.*

MASSEGUIN, A., TAILLEFER-GRIMALDI, J. & LEVEUF, J. J. **Etude générale de l'onchocercose. [General Study of Onchocerciasis]** *Bull. Méd. de l'Afrique Occidentale Française.* 1954, Nov., No. 2, Special No., 141-69, 1 folding coloured pl.

Surveys carried out in French West Africa between 1950 and 1954 have revealed 114,702 cases of clinical onchocerciasis among a population of 3,378,900. The percentage rate of infection varied from 4·6-7·0 per cent. in Upper Volta and Dahomey down to 0·1 per cent. in Senegal. Mauritania is free from onchocerciasis. The real number of people with onchocerciasis is probably much greater than the above figure. The distribution of the condition is very patchy; figures are given for the different localities, but these are admittedly not very accurate. The chief foci are in Upper Volta, North Dahomey, Sudan, and Guinea. The infection is frequent in villages along certain watercourses but the areas in between are relatively free from infection. Accordingly, it is difficult to indicate the distribution on a

map unless the scale is large. However, further details about the distribution are given in the text and in a map, for which the original paper should be consulted.

Clinically, the manifestations of infection may appear as cysts, as cutaneous lesions, or as ocular lesions, but usually only one of these manifestations is prominent in a particular patient. It is the ocular lesions which render onchocerciasis a "veritable social scourge". PETARD has found that the concentration of total protein in the serum is raised (84-108 gm. per litre) compared with the mean normal figure (82 gm. per litre) for Africans; this is due to increase in the total globulins (41-67 gm. per litre) compared with a normal mean of 39 gm. The gamma globulins are especially raised while the α_1 globulins are diminished. [See also this *Bulletin*, 1955, v. 52, 670.]

The official treatment in French W. Africa consists of two courses of diethylcarbamazine (Notézine) each consisting of 3.40 gm. during 10 days, followed by 5 gm. of suramin during 5 weeks. All this is repeated once in the first year and once again in the second year. Cysts are excised when possible. Allergic reactions occur in 93 per cent. of adults, but these are seldom intolerable. About 70 per cent. of the patients are cured clinically and parasitologically; 30 per cent. still harbour microfilariae but these cases might be re-infections.

The entomological staff in French W. Africa is too small for control or eradication of *Simulium* to be attempted. Preliminary results with chemo-prophylaxis have suggested that the monthly administration of 0.3 gm. diethylcarbamazine might be sufficient to protect people against contracting the infection. At present, however, the infection occurs on such a large scale over such vast areas and the money and men available to combat it are so limited that the problem of its control seems almost insoluble.

F. Hawking

BURCH, T. A., AGUILAR, G. G., BARRERA, M. & DALMAT, H. T. Proyecto piloto de una campaña de tratamiento médico de la oncocercosis, basado en la administración de suramina sódica (U.S.P. XIII). Parte II. Tratamiento y observación subsiguiente. [Pilot Project for a Medical Treatment Campaign against Onchocerciasis based upon the Administration of Suramin Sodium (U.S.P. XIII). Part II. Treatment and Follow-Up Examination] *Bol. Oficina Sanitaria Panamericana*. 1955, Feb., v. 38, No. 2, 141-7. English summary.

The preparation of suramin used in this work was given intravenously in an initial dose of 0.5 gm. for an adult of 50 kgm. followed by 7 doses each of 1.0 gm. at intervals of one week. For patients below or above this weight the doses were adjusted. Children in whom the intravenous route could not be used were given the drug by mouth in aqueous solution, but in higher doses than for intravenous administration. Thus, children were given an initial oral dose of 1 gm. and succeeding doses of 2 gm. each.

Subsequent observations were made on 932 patients, of whom 450 received the full course, 281 received less than 7 injections and 201 received the drug by mouth. Microfilariae were present in 35.3 per cent. before treatment, and in 7.5 per cent. two years after treatment, and in the group which received the full course the percentages were respectively 41.1 and 1.7. Smaller reductions were observed in the numbers with nodules. [It is not clear how the persons were selected for treatment, since only half had microfilariae or nodules. It may be that in this highly infected population those who presented themselves during the 9-week campaign were treated. See also this *Bulletin*, 1955, v. 52, 919.]

The English summary appended to the paper is as follows:—

“A Pilot campaign against onchocerciasis based upon the administration of suramin sodium was conducted in Yepocapa, Chenaltenango, Guatemala. This caused a spectacular reduction in the incidence of persons with demonstrable microfilariae. Suramin administered orally to children was not effective.

“The suramin used in this trial was considerably more toxic than that used in preliminary studies. It is felt that the brand used in this pilot campaign should only be used on hospitalized patients or those with constant medical supervision. Future medical programs should use only well established brands such as those in constant use in Africa for the treatment of sleeping sickness.”

Charles Wilcocks

ROUSSELOT, R. Pathologie des anthropoïdes. (3e note.) Sur la localisation et l'incidence réelles de *Dipetalonema vanhoofi* Peel et Chardomme, 1946. [Pathology of Anthropoids. Localization and Incidence of *Dipetalonema vanhoofi*] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 59-61.

SMITH, A. Microfilaraemia in Rock Rabbits. [Correspondence.] *Nature*. 1955, July 2, v. 176, 38-9.

Among animals found to harbour microfilariae on Ukara Island, Tanganyika, were rock rabbits, *Heterohyrax syriacus diesneri*: infection was found in “57 per cent” (16) of 28 such animals.

Comparison of body lengths of the individual hyrax with the number of microfilariae found in standard blood films is shown in a table. It is evident that there was a general positive correlation between the size of the host and the intensity of microfilarial infection in this species of wild mammal taken from the field.

H. J. O'D. Burke-Gaffney

ANRAEDT, J. L. & BRYGOO, E. R. Sur un cas de dracunculose scrotale. [A Case of *Dracunculus* Infection of the Scrotum] *Bull. Soc. Path. Exot.* 1955, v. 48, No. 1, 57-8, 3 figs. on 2 pls.

GLOCMAN, K. Epidemiologické a hygienické poznámky k helminthiasám. [Epidemiologic and Hygienic Comments on Helminthiasis] *Českoslov. Hyg., Epidemiol., Mikrobiol., Imunol.* Prague. 1955, v. 4, No. 4, 206-11.

The English summary appended to the paper is as follows:—

“We examined 1606 children of Ústí from 1 to 7 years in 41 kindergartens and 15 nurseries as to intestinal parasites. We used the swab method for obtaining the examination material and applied the Faust laboratory technique. We ascertained that the contamination by helminths was insignificant in the nurseries, rose in urban kindergartens and reached its maximum in rural kindergartens. The contamination depended on the hygienic conditions existing in the children's institutions themselves and in their households, as well as on the personal hygiene of the infected children and of their underwear. We detected *Oxyuris vermicularis* in as many as 93%, *Trichuris trichura* in 7% and *Ascaris lumbricoides* in 1.6% of cases.

In two cases *Hymenolepis nana* could be identified. We even ascertained a simultaneous infection of children by three kinds of worms."

MODI, C. J. & DAVE, C. V. **Incidence of Threadworm (*Enterobius vermicularis*) Infestation in School Children in Ahmedabad.** *Indian J. Child Health.* 1955, Apr., v. 4, No. 4, 205-7.

" 1. 250 school children in Ahmedabad have been investigated for threadworm infestation by the cellotape slide technic.

" 2. 44.4% of the children were found to be suffering from threadworm infestation.

" 3. The high incidence emphasises the need for greater stress on health education in schools."

ELWI, A. M. & EL-TIRAEI, I. **Appendiceal Oxyuriasis. A Pathological Study.** *J. Egyptian Med. Ass.* 1955, v. 38, No. 2, 125-34. [20 refs.]

STILL (*Brit. Med. J.*, 1899, Apr. 15, 898) was the first to report the occurrence of *Enterobius* in inflamed appendices and it was generally believed at that time that there was a causal relationship, that the worms could cause traumatic lesions of the mucosa which would allow bacteria to enter into the wall and there set up inflammation; it was also thought that the mucosal lesions led to the formation of fibrous tissue with kinking of the appendix. GORDON [this *Bulletin*, 1934, v. 31, 131] recorded the results of examination of 26,051 appendices without finding a single case in which *Enterobius vermicularis* could be considered to be a cause of pathological changes, though he recorded finding in 12 instances minute mucosal lesions which he considered to be due to pressure when the worm was caught between a faecal concretion and the wall of the appendix; in 33 instances the worms had penetrated into the tissues, which he believed to have occurred after removal of the organ; worms may die in the tissues and excite the development of a granuloma around themselves; of this he found one instance.

The authors have studied 470 appendices removed at operation and examined by paraffin sections for *Enterobius*, and also by a concentration method. The incidence of *Enterobius* in the appendix was found by histological examination to be 9.7 per cent., but by concentration of the contents it was 27.23 per cent. In this series the incidence in most types of chronic appendicitis, whether schistosomal or non-schistosomal, approached that in normal appendices; in acute suppurative cases the incidence was much lower, presumably because the suppurative process destroys the worms in the lumen of the appendix; in chronic appendicitis with stenosis it dropped from 38.7 per cent. to 0 with the onset of acute suppuration; in chronic schistosomal appendicitis with stenosis from 44 to 25 per cent., and in schistosomal non-obliterative appendicitis from 32.3 to 15.4 per cent. In 5 cases there were granulomata containing *Enterobius* worms; apart from these no mucosal lesions caused by the worms prior to operation were seen. Of the 470 appendices, 97 appeared to be normal and in 46.3 per cent. of these oxyurids were present. In no case in the series was *Enterobius* considered to be the cause of the pathological changes found in the remainder, with the exception of the 5 granulomata.

W. L. Harnett

AGOSTINUCCI, G. Osservazioni sull'efficacia dell'idrato di piperazina nelle infestazioni da *Enterobius vermicularis*. [Piperazine Hydrate in Enterobiasis] *Nuovi Ann. d'Igiene e Microbiol.* 1955, Mar.-Apr., v. 6, No. 2, 137-41. [17 refs.]

The English summary appended to the paper is as follows:—

“The author corroborates the therapeutic effectiveness of daily 10 cg per year of age (2 g for adults) of piperazine hydrate *per os* in more than 100 patients suffering from *Enterobius vermicularis* infestation.

“The remedy has shown the same efficacy in the double infestation by *E. vermicularis* and *Ascaris lumbricoides*. Toxic symptoms and intolerance against this form of treatment were never observed.”

MAZZOTTI, L. & ALCÁNTAR, Oliva. Incidencia de *Trichinella spiralis* en 900 ratas (*Rattus norvegicus*), en la ciudad de México. [Incidence of *Trichinella spiralis* in 900 *Rattus norvegicus* in Mexico City] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 201-2.

The English summary appended to the paper is as follows:—

“900 wild rats (*Rattus norvegicus*) were examined in Mexico City. 2% were found infected with *Trichinella spiralis* and 3% with *Sarcosystis muris*.”

TOMPKINS, V. N. & MURASCHI, Thelma F. Complement-Fixation Test for Trichinosis. *Amer. J. Clin. Path.* 1955, Feb., v. 25, No. 2, 206-18, 1 fig.

“A procedure for the complement-fixation test is presented as an aid in the diagnosis of trichinosis. This involves the examination of patient's serum, undiluted and in saline dilution (1:5), with 3 50-per cent units of complement and a minimum of 3 dilutions of antigen. Sharp prozones and inhibitory effects of serum and complement observed are offset by this schema, allowing earlier detection and higher sensitivity.

“Complement-fixation reactions are highly specific. They indicate relatively recent infection, especially when the reactions show a rising titer. Reaction persists only for 6 to 18 months following infection; it apparently is not induced by skin tests.”

DEFICIENCY DISEASES

DELON, Jeanne. Les principales carences de l'enfant marocain. [The Principal Nutritional Deficiencies in Moroccan Children] *Maroc. Méd.* 1954, June, v. 33, No. 349, 580-84.

Nutritional disorders are common among the children of the Mohammedian population of Morocco. Simple deficiencies are rare but mixed deficiencies are frequent. A poor diet and alimentary disturbances impairing assimilation of nutrients are frequently associated. The most important disorders are (1) acute dehydration, which is common in the hot summer;

(2) protein deficiency leading to the characteristic clinical picture of kwashiorkor: the social importance of this disease is great; (3) rickets, which is much commoner than in France. A poor diet, digestive disorders and a lack of sunlight in the poor houses are the responsible factors. Congenital syphilis often complicates the picture.

R. Passmore

FIELD, C. Elaine. **Nutritional Problems in the Federation.** *Med. J. Malaya.* 1955, Mar., v. 9, No. 3, 179-94, 9 figs. [11 refs.]

Malnutrition is met with in Malaya although it is less prevalent here than in other Asian countries. It occurs mainly in the 1-5 age-group. Occasional cases of uncomplicated beriberi and kwashiorkor are seen, but the most common clinical picture is that of multiple deficiencies. Of these the most prevalent are defects of calories, proteins, Vitamin A, thiamine, riboflavin, calcium and iron. In the majority of cases gastro-enteritis, dysenteries, and round worm infection complicate and profoundly affect the end result.

"The essential foodstuffs are easily obtainable in Malaya so that prevention of malnutrition is largely education of the parents and schoolchildren to break down superstitions and long-time customs."

[This article is salutary. In most regions the problems are very similar to those of Malaya, and the most widespread and serious forms of malnutrition are multiple in nature and complex in aetiology. But so much research has been concentrated on one disease, or on minor details of one disease, that the broad aspects of the problems of nutrition have been overlooked.]

Cicely D. Williams

GOPALAN, C., SRIKANTIAH, S. G. & VENKATACHALAM, P. S. **Electrocardiographic Changes in Severe Malnutrition.** *Indian J. Med. Res.* 1955, Jan., v. 43, No. 1, 15-21, 9 figs. on 4 pls. [17 refs.]

Electrocardiograms were studied on 16 adults and 10 children suffering from severe nutritional oedema consequent upon long periods of semi-starvation. The oedema was not of cardiac or renal origin and not attributable to beriberi.

The findings may be summarized as follows:

Heart rates: These varied widely—from 44 to 92 in adults and from 70 to 160 in the children. Bradycardia was common in adults, but also occurred in children.

Rhythm: No consistent significant changes were found.

Interval Changes: The duration of the P waves and the QRS complexes did not show any abnormality. PR intervals were within normal limits, but the QT interval relative to the rest of the cardiac cycle was increased in 15 of the 16 adults.

Amplitude Changes: There was marked reduction in the amplitudes of the P waves, QRS complexes and T waves in most of the adults and children. After treatment with high protein diets, most of the amplitudes increased.

In discussion it is pointed out that all the changes were non-specific and likely to be produced by several agencies. They could not be attributed to alterations in serum electrolyte levels, which when studied showed only minor departures from normality. There was no correlation between the degree of electrocardiographic changes and the extent of the oedema.

The question whether cardiac conditions observed in parts of the world where calorie and protein deficiencies are common, can be attributed to these deficiencies is briefly discussed. Chronic myocarditis of unknown aetiology is reported to be not uncommon in hospital practice in South India.

R. Passmore

DEAN, R. F. A. **Protein Requirements and their Satisfaction.** *East African Med. J.* 1955, Mar., v. 32, No. 3, 79-86.

This is the text of a paper read to a conference on Food Production in East Africa. It is a pleasant blend of the theoretical and the practical and can be thoroughly recommended to the newcomer to the subject. The experienced reader will probably find nothing new. The author emphasizes the need in under-developed countries of concentrating on improving the quantity of protein available. The quality of individual proteins is relatively much less important.

R. Passmore

BASSIR, O. **A Pathological Study of the Effect of Low-Protein Diet on Liver Cell Metabolism.** *West African Med. J.* 1955, June, v. 4 (n.s.), No. 2, 78-91, 9 figs. [29 refs.]

"(1) When phosphoprotein is withheld from the diet of adolescent male albino rats for four days, they lose most of the labile protein and ribonucleic acid of the cytoplasm of their liver cells.

"(2) This is demonstrated both by tracer studies and by histochemical means.

"At the same time, the amount of deoxyribonucleic acid, per gram liver, increases. So does its relative activity.

"If the low-protein dietary regimen is followed by a day's repletion with a fully adequate diet, the reverse of the depletion picture is given.

"(3) The re-arrangement and structure of the basophilic particles of liver cytoplasm of depleted and repleted animals are illustrated, and their implication discussed.

"(4) Glycogen amassed in the liver during depletion has been located by an histological method. What happens to this glycogen on repletion is also indicated.

"(5) The alteration of liver size, relative to body weight, with age has been confirmed."

THOMPSON, M. D. **Potassium Deficiency and Kwashiorkor.** [Correspondence.] *Lancet.* 1955, June 4, 1181.

Potassium deficiency is an important complication of kwashiorkor in Uganda. Severe diarrhoea is the chief predisposing cause. Anorexia, especially if associated with vomiting, abdominal distension, and weakness in a child with past or present diarrhoea, should lead one to suspect potassium deficiency. Electrocardiographic signs (a long P-R interval and flat T waves) and low levels of potassium in the serum are diagnostic aids. Several patients had serum potassium levels below 4 m.eq. per litre and one as low as 1.6. However, the serum level may be normal despite a tissue deficiency. When the evidence strongly suggests the disorder, replacement therapy (1.0 gm. of potassium chloride daily by mouth) often leads to rapid improvement. Owing to the dangers of intoxication, intravenous therapy was

seldom considered desirable. Mild subclinical cases probably receive sufficient potassium in their milk.

R. Passmore

SAN JUAN, F. Anemias macrocíticas megaloblásticas e avitaminoses do grupo B—Considerações gerais—Apresentação de um caso de arriboflavinoze com reação leucemóide. [Macrocytic Megaloblastic Anaemia and Group B Avitaminosis—Ariboflavinosis Case with Leukemoid Reaction] *Hospital*. Rio de Janeiro. 1954, May, v. 45, No. 5, 607-28, 2 charts. [25 refs.]

The English summary appended to the paper is as follows:—

“ It's been the author's purpose to make a general survey of the interrelationship between some pictures of megaloblastic macrocytic anemia and vitamin B complex deficiencies.

“ As an illustration he presents a rare case of ariboflavinosis showing a megaloblastic macrocytic anemia with myelogenous aleukemic leukemoid picture occurring in a pregnant woman with amebiasis.

“ He further analyses briefly the role of amebiasis and pregnancy on the changes in the blood picture, stressing the main pathogenic influence of ariboflavinosis.”

HAEMATOLOGY

VANDEPITTE, J. Present-Day Aspects of the Sickle-Cell Problem. *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 154-63, 3 figs. [32 refs.]

“ (1) A brief historical review is given of the sickle-cell problem, with special reference to the biochemical and genetical studies that lead to the individualisation of the sickle-cell trait and sickle-cell anaemia.

“ (2) It is pointed out that some simple laboratory tests allow a rapid routine-differentiation between sickle-cell anaemia and sickle-cell trait superimposed on an unrelated anaemia.

“ (3) Recent findings in the Belgian Congo contradict the general belief of the paucity of cases of sickle-cell anaemia in Africa.

“ (4) During the past two years 233 cases of sickle-cell anaemia were detected in Leopoldville. The genetical pattern of these cases is in conformity with the theory of homozygosity of Neel.

“ (5) The perpetuation of the sickling gene, in spite of the high mortality of the homozygotes, raises an interesting genetical problem. Data are presented which suggest that the gene is not maintained by a high mutation rate, but rather by a selective advantage of the sickle-cell trait.”

LAMBOTTE-LEGRAND, J. & LAMBOTTE-LEGRAND, C. Anémie drépanocytaire et homozygotisme (à propos de 300 cas). [Sickle-Cell Anaemia and Homozygosity] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 47-51. [14 refs.]

This paper surveys the history of the correlation between sickle-cell anaemia and the homozygous state for the sickle phenomenon. It is worth noting that the authors had thought of such a correlation as early as 1948,

and that they reported this in their memoranda of the paediatric service of the Red Cross of the Belgian Congo at that time. At present they have seen 300 cases of sickle-cell anaemia, and of the 297 mothers they were able to examine 294 possessed the sickle-cell trait. Of the 277 fathers available for testing 259 were found positive. As sickle-cell anaemia seems to be found in homozygotes one would expect a high incidence of the disease if all the homozygotes were suffering from it. This would be particularly so in the Belgian Congo where the incidence of the trait is 25 per cent. Circumstantial evidence is given by the high incidence of sickle-cell anaemia in children. In Léopoldville, a town with 260,000 Africans, about 1.65 per cent. of all young children suffer from the disorder. Another finding was that the incidence of the sickle-cell trait in the families of patients with sickle-cell anaemia was such as it would be if both parents were carriers of the gene.

H. Lehmann

LAMBOTTE-LEGRAND, J. & LAMBOTTE-LEGRAND, C. Le pronostic de l'anémie drépanocytaire au Congo Belge (à propos de 300 cas et de 150 décès). [The Prognosis of Sickle-Cell Anaemia in the Belgian Congo in the Light of 300 Cases and 150 Deaths] *Ann. Soc. Belge de Méd. Trop.* 1955, Feb. 28, v. 35, No. 1, 53-7, 1 graph.

From August 1948 to July 1954 the authors have seen 300 cases of sickle-cell anaemia in the Belgian Congo. The mean age at which the diagnosis was made was one year and five months. Although sickle-cell anaemia is seen in 1.5 to 2.0 per cent. of the young children it has only been seen twice yet in an adult. Of the children 150 have already died, 72 of them before the age of one year. It seems that the prognosis becomes better the longer the children survive and the later in life the diagnosis is made. There was a tendency for the disease in female infants to be diagnosed earlier and to be more often fatal than in male infants.

H. Lehmann

ENDE, N., PIZZOLATO, P. & ZISKIND, J. **Sicklemia.** *Ann. Intern. Med.* 1955, May, v. 42, No. 5, 1065-75, 8 figs. [13 refs.]

"Four cases are presented of non-anemic patients with pathologic conditions apparently produced by the sickle cell phenomenon. An attempt was made to establish whether these patients had some atypical type of sickle cell anemia. Genetic histories, electrophoretic patterns and alkali denaturation values as well as clinical history all were typical for the sickle cell trait."

SILVESTRONI, E. & BIANCO, I. **New Data on Microdrepanocytic Disease.** *Blood.* 1955, June, v. 10, No. 6, 623-32, 2 figs. [13 refs.]

Microdrepanocytic disease is a disorder in which a person is heterozygous for both the thalassaemia gene and the gene for the sickle-cell haemoglobin. As both conditions are not infrequent in the eastern district of Sicily the authors have surveyed anaemic out-patients in a number of localities in that area. By doing so they have found no less than 35 cases of microdrepanocytic disease. The clinical condition shows wide variation and varies from serious incapacity to mild forms, in fact in one instance a person was found who was microdrepanocytic without having yet produced any symptoms. In 14 cases, about half the total, the signs of disease

appeared during early childhood. In others the first symptoms presented themselves only at 6 to 8 or even 10 years of age. The women seem to be almost invariably infertile and, though there were miscarriages, no live births were seen in microdrepanocytic females, but the males were able to produce offspring.

H. Lehmann

SMITH, C. H., SCHULMAN, I., ANDO, R. E. & STERN, Gertrude, with the technical assistance of Eleanor FORT & Joyce PRESTWIDGE. **Studies in Mediterranean (Cooley's) Anemia. I. Clinical and Hematologic Aspects of Splenectomy, with special reference to Fetal Hemoglobin Synthesis.** *Blood.* 1955, June, v. 10, No. 6, 582-99, 9 figs. [45 refs.]

Nine patients suffering from the disease were studied in New York, their ages ranging from 4 to 18 years, and from each the spleen was removed. After this operation it was found that a slightly improved haemoglobin level was maintained with fewer transfusions than were necessary before splenectomy.

To assess the fate of transfused blood in patients with an intact spleen, red cell survival studies were undertaken in 5 patients of varying age. In a child of one year the life span of transfused erythrocytes was normal, and when surviving cells were plotted against time a straight line was obtained. When this was repeated, however, in the remaining 4 older patients irregular lines were obtained indicating, it is suggested, "random destruction of transfused cells regardless of their age". It also appeared that the life span of transfused erythrocytes became progressively shortened with increasing age of the patient. It is thought that these phenomena indicate that a secondary haemolytic mechanism occurs in patients with the disease. In two other patients with Mediterranean anaemia, and in a further patient with Mediterranean-anaemia-sickle-cell disease, red blood cell survival was studied after splenectomy and was then found to approach normal.

The effect of splenectomy upon the total circulating haemoglobin mass and upon foetal haemoglobin synthesis was estimated in these three cases. The circulating haemoglobin mass increased in two and remained virtually unchanged in the third. In all patients there was a slightly increased rate of production of foetal haemoglobin, indicating that its method of production is independent of the presence or absence of the spleen.

Microscopical examination of the spleen removed in these cases failed to disclose any relationship between red cell survival and the extent of fibrosis, erythropoiesis, follicular changes or iron deposition.

The conclusion is reached that "this favourable report does not imply indiscriminate removal of the spleen in the severe disease. Furthermore, the benefits recorded here must be tempered by the knowledge that this procedure represents a palliative measure, which does not influence the fundamental intracorporeal defect. Information is not yet available as to the complete clinical and hematologic course and the ultimate outcome in the post-splenectomy period on the basis of the principles outlined in this paper".

[These conclusions require emphasis, for in chronic haemolytic anaemia it is necessary to check the tendency too readily to remove the spleen. Early work on splenic anaemia by McMICHAEL is liable to be forgotten; he concluded that after taking into consideration the spontaneous fluctuation in the blood picture that may occur in the disease, no striking improvement could be attributed to splenectomy. In the study here reported it is

unfortunate that red cell survival after splenectomy was not estimated in the patients in whom similar estimations were made before splenectomy.]

A. W. Woodruff

LANGE, R. D. & HAGEN, P. S. **Hemoglobin C Disease in Identical Twins.** *Amer. J. Med. Sci.* 1955, June, v. 229, No. 6, 655-60, 3 figs. [28 refs.]

"The case histories and laboratory findings of hemoglobin C disease in identical Negro twins have been presented.

"The diagnosis may be suspected by the presence of splenomegaly, anemia, reticulocytosis, numerous target cells and absence of sickling, but electrophoretic studies are essential for confirmation.

"Red cell survival studies showed a markedly shortened survival time of autotransfused cells, indicating the presence of a hemolytic process.

"From a clinical point of view, in our subjects hemoglobin C disease was an apparently benign condition."

TASKER, P. W. G. **Correlation of Serum-Vitamin B₁₂ Levels and Urinary Folic Acid in Nutritional Megaloblastic Anaemia.** *Lancet.* 1955, July 9, 61-3, 1 fig. [19 refs.]

Though it is generally accepted that the primary deficiency in nutritional megaloblastic anaemia is one of folic acid, it is known that vitamin B12 has been found therapeutically active in some instances in India [this *Bulletin*, 1952, v. 49, 77], and that low serum-vitamin B12 levels have been seen not only in patients with pernicious anaemia but also in some with other types of megaloblastic anaemia. This investigation of 29 patients with nutritional megaloblastic anaemia was performed at the Institute for Medical Research in Kuala Lumpur, Malaya. In no less than 9 of them the serum-vitamin B12 level was found to be below the normal range of 100-720 $\mu\text{g}/\text{ml}$. When urinary folic acid excretion was measured after a loading dose of 5 mgm. of folic acid, given by subcutaneous injection, a diminished excretion was seen in all instances where the serum-vitamin B12 level had been found to be below normal. No such close correlation was noted when the folic acid loading dose was given by mouth, presumably because in some patients absorption of folic acid was impaired. [This investigation goes far to prove that both vitamin B12 and folic acid are involved in the processes which are disturbed in nutritional megaloblastic anaemia.]

H. Lehmann

See also p. 1023, HIGGINSON, **Siderosis in Southern Africa.**

VENOMS AND ANTIVENENES

SCHÖTTLER, W. H. A. **Serological Analysis of Venoms and Antivenins.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 6, 877-903. [18 refs.]

This paper should be read in full. The following is a translation of the author's summary in French, which is fuller than the summary in English:—

In Brazil 6 species of snakes of the genus *Bothrops* (*alternata*, *atrox*, *cotiara*, *jararaca*, *jararacussu*, *neuwiedii*) are considered dangerous. A polyvalent serum against the venoms of this group is prepared by immunizing horses with an antigen containing a mixture of 6 venoms in determined proportions. The assay of this serum is carried out, in accordance with official requirements, by tests with a single venom, that of *B. jararaca*. The difficulty of obtaining the 6 venoms necessary for the production of the polyvalent serum, and the possibility that the titres obtained after assay do not correspond to the neutralization of all the antigens present in the mixture, have raised the following questions:—Are the 6 venoms essential to the production of a polyvalent anti-*Bothrops* serum, and does the assay against a single venom really prove the actual effectiveness of the serum against the other venoms?

Some 11,000 injections, intravenous and subcutaneous, have been made in mice, either with venom alone or with mixtures of venom and monovalent or polyvalent antisera. The results have been submitted to probit analysis.

Two properties determine the practical value of an antivenene: its neutralizing capacity (or the amount of venom it can neutralize) and the width of its neutralizing spectrum. Experiment has proved that the polyvalent anti-*Bothrops* serum was without question more efficacious than the monovalent sera and that the next most efficacious were the anti-*jararaca* and *neuwiedii* sera. Although the neutralization spectra of the 2 sera and of the anti-*atrox* serum are as wide as that of the polyvalent serum, the latter's superiority as proved by experiment lies in its greater concentration which results in a higher antibody rate (by reason of the method of its preparation) than is the case with the monovalent sera. The monovalent sera, *jararaca*, *neuwiedii* and *atrox*, would probably be as satisfactory as the polyvalent serum if they were prepared in the same way.

Of the difficulties encountered in the course of his research, the author makes special mention of one, namely that of obtaining reproducible results. This difficulty arose from the varying toxicity of different samples of venom from the same species of snake, from divergences in the sensitivity of different experimental animals to venom and from the complexity of venom-antivenene relationships.

John Rathborn

ABALOS, J. W. Vachonia, nuevo género de escorpiones. [Vachonia, a New Genus of Scorpions] *An. Inst. Med. Regional*. Tucuman. 1954, Dec., v. 4, No. 1, 119-24, 17 figs. English summary.

GARCIA, Isabelle. Sur la dégradation de l'arginine par l'hépatopancréas d'un Scorpion (*Androctonus australis* L.). [Degradation of Arginine by the Hepatopancreas of the Scorpion *Androctonus australis*] *C. R. Soc. Biol.* 1955, Feb., v. 149, Nos. 3/4, 251-4, 1 fig.

TANGE, Y. Beitrag zur Kenntnis der Morphologie des Giftapparates bei den japanischen Fischen, nebst bemerkungen über dessen Giftigkeit. IX. Über den Giftapparat bei *Sebastodes inermis* (Cuvier et Valenciennes). [Morphology of the Poison Apparatus of Japanese Fish, with Observations on their Toxicity. IX. Poison Apparatus of *Sebastodes inermis*] *Yokohama Med. Bull.* 1954, Dec., v. 5, No. 6, 429-34, 3 figs.

TOXOPLASMOSIS

ROMAÑA, C. & LIFSHITZ, J. Intradermo-reacción con toxoplasmina en personas de Tucumán (R.A.). [Intradermal Reaction with Toxoplasmin in Inhabitants of Tucumán, Argentina] *An. Inst. Med. Regional. Tucumán.* 1954, Dec., v. 4, No. 1, 77-9. French summary (8 lines).

The following is a translation of the authors' summary in French:—

The authors record the results of intradermal reactions (Frankel) with toxoplasmin, carried out in Tucumán on 72 persons of different ages, sex and social conditions: 45.8 per cent. were positive. Readings were made after 48 and 72 hours. There were only 4 doubtful reactions and the controls were all negative. The results obtained were of the same order as those found in other countries.

H. J. O'D. Burke-Gaffney

GUTIÉRREZ BALLESTEROS, E., MANZANO, J. & BIAGI F., F. Encuesta sobre toxoplasmosis en un grupo de débiles mentales. [Study of Toxoplasmosis in a Group of Mentally Defective Children] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 197-200. [23 refs.]

The English summary appended to the paper is as follows:—

"In Mexico, D.F., 58 deficient mental and 20 normal children were examined, but cutaneous tests with toxoplasmin, complement fixation test, using Westphal's antigen, ophthalmologic examination and radiographic study of head.

"No correlation was found between oligophrenia and toxoplasmosis, in this group."

GRÖNROOS, P., OLLILA, O. & SAXÉN, E. Glandular Toxoplasmosis. A Case report. *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1955, v. 33, Nos. 1/2, 204-12, 2 figs. [26 refs.]

GRÖNROOS, P. & SALMINEN, A. Toxoplasmosis in Norway Rats in Helsinki. *Ann. Med. Exper. et Biol. Fenniae.* Helsinki. 1955, v. 33, Nos. 1/2, 141-4. [11 refs.]

"The Toxoplasma antibodies were studied in the sera of 108 rats (*Rattus norvegicus*) captured in Helsinki. The dye test was positive in 12 per cent in a dilution of $> 1/4$. The titers were low, the highest being 1/64. The complement-fixation test gave positive results in 4 per cent.

"No correlation was found between Toxoplasma antibodies and the occurrence of *Trypanosoma lewisi* in the blood (38 per cent) and the presence of antibodies against *Leptospira icterohaemorrhagiae* (52 per cent)."

DERMATOLOGY AND FUNGUS DISEASES

MARTÍNEZ BÁEZ, M., REYES MOTA, A. & GONZÁLEZ OCHOA, A. *Blastomycosis norteamericana en México.* [North American Blastomycosis in Mexico] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 225-32, 24 figs. on 3 pls.

The English summary appended to the paper is as follows:—

“The first Mexican case of North American blastomycosis is described; pathological data and the mycological study which made possible the identification of the parasite as *Blastomyces dermatitidis* Gilchrist and Stokes, 1898, are presented.”

ESTEVEZ, J. & ANTUNES, Maria M. *Acladiosis. Report on a Case.* *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 140-45, 7 figs.

“The authors describe a case of chronic dermatosis of the ulcerative and crust forming type which spread over the face, neck and thorax of the patient over a period of two years, without any subjective symptoms or changes in the general condition of the 46-year-old patient's health. The first symptoms appeared six months after his return from Portuguese Guinea where he had lived for ten months. Histological examination revealed the lesions to be tuberculoid granulomas caused by a fungus. Mycological investigation proved it to be *Aleurisma castellanii* (Pinoy).

“Apart from the rarity of the disease the observation of the parasite in the histological preparations is of particular interest; also the fact that it was possible to obtain cultures of the fungus from fragments of the biopsy only.”

[See this *Bulletin*, 1935, v. 32, 181.]

SUTOMO TJOKRONEGORO, LIE KIAN JOE & NJO-INJO TJOEI ENG. *A Case of Penile Rhinosporidiosis in Indonesia.* *Documenta Med. Geograph. et Trop.* Amsterdam. 1955, June, v. 7, No. 2, 113-15, 2 figs.

“A case of penile rhinosporidiosis is described; it occurred eight years after the patient left India, his native country. This is the first case of rhinosporidiosis reported from Indonesia; the infection appears to have been acquired in those islands, or perhaps during brief visits to Malaya.”

[See this *Bulletin*, 1942, v. 39, 413.]

TROPICAL OPHTHALMOLOGY

EL BAYADI, G. *Clinical Observations on the Effect of 3,4-Dimethyl-5-Sulfanilamido Isoxazole (Gantrisin) in Trachoma.* *Bull. Ophthalm. Soc. Egypt.* 1954, v. 47, Session 51, 211-15.

Forty-five patients with trachoma in different stages were treated by the author. Of these 25 were observed for 4 to 6 months and the final results of treatment were assessed. In the investigation 3,4-dimethyl-5-sulphanilamido-isoxazole (Gantrisin) was used both locally and systemically. A

solution of 15 per cent. was well tolerated and instillations were given every 2 hours during the day only. Marked subjective improvement in all cases occurred within 5-7 days. Cases with small follicles (stage T.1) showed complete resolution within 2-3 months. Patients with large follicles first received mechanical treatment followed by instillations for 2-3 months, and showed some scarring but no active infiltration at the end of treatment. Cases with corneal complications showed a better response when the instillations were combined with oral administration. Resolution leaves residual thin corneal scars, in marked contrast to those cases treated with local irritant chemicals.

E. W. O'G. Kirwan

MITSUI, Y., YAMASHITA, K. & HANABUSA, J. **Treatment of Trachoma with Tetracycline.** *Rev. Internat. du Trachome.* 1955, v. 32, No. 2, 163-7.

Tetracycline (Achromycin, Tetracycline) is a new antibiotic derived from chlortetracycline. It is reported to be more stable in solution form and less toxic than chlortetracycline [aureomycin]. Using a topical application of 1 per cent. tetracycline ointment in a petroleum base 3 times a day for 8 weeks the authors treated 164 cases of trachoma in the chronic stage.

The first sign of clinical improvement was apparent after treatment for 1-2 weeks. During the period of 8 weeks' treatment, clinical cure was evident only in about 10 per cent. of the cases. In most of the patients the clinical symptoms continued to decrease after the end of the treatment and in 3 months after the end of the treatment 128 or 78 per cent. of the patients were found to be clinically cured. A relapse of inflammation was uncommon. The authors found that tetracycline was effective against the trachoma virus directly and appeared to be a little superior to chlortetracycline.

E. W. O'G. Kirwan

PANNARALE, M. R. Résultats de la thérapie erythromycinique dans le trachome. Recherches microbiologiques et cliniques. [Results of Treatment of Trachoma by Erythromycin: Microbiological and Clinical Studies] *Rev. Internat. du Trachome.* 1955, v. 32, No. 2, 215-32. [15 refs.]

The author records the result of his studies in the treatment of trachoma with erythromycin from the point of view of its action on the Halbertsaedter and Prowazek [HP] inclusion bodies, the secondary conjunctival infection and the clinical signs of the disease. Several different small groups of patients were treated. He used a topical application of 1 per cent. erythromycin ointment 5 times daily for 15 days or by the oral route 6 mgm. per kgm. of body weight every 8 hours. He found no noticeable difference whether the treatment was given locally or perorally or in combination but local therapy was the most efficacious in acute cases. By its action the HP bodies and the secondary conjunctivitis disappeared in 2 days, acute trachoma in 6 days, the corneal lesions in 15 days and conjunctival nodules and papillae within 2 months.

E. W. O'G. Kirwan

HEAT STROKE AND ALLIED CONDITIONS

AMBLER, H. R. **Notes on the Climate of Nigeria with reference to Personnel.** *J. Trop. Med. & Hyg.* 1955, May, v. 58, No. 5, 99-112, 4 figs. & 1 map.

The author records information on the climate of Nigeria and describes observations on the thermal comfort of male Europeans there.

Average monthly maximal wet bulb temperatures for Port Harcourt and Jos in Nigeria are compared with similar data for Calcutta, Madras, Poona and Lahore. There are graphs showing the monthly maximum and minimum air temperatures for Port Harcourt, Lagos, Jakiri and Kano, the last being at an altitude of 1,700 ft. and described as semidesert. Similar figures are given for sites in jungle clearing and jungle undergrowth at Nkpoku, at sea level. The monthly maximum and minimum relative humidities for the various sites in Nigeria are also shown in graphs.

From the study of thermal comfort it is concluded that effective temperature is a fairly good index of discomfort for persons not engaged in heavy physical activity. Appreciable discomfort occurs at effective temperatures above 80°F., and untrained persons find effective temperatures of 83°F. or more very uncomfortable.

In a hot, wet climate even low air speeds of the order of 15 ft. per min. exert an important effect on the comfort of sedentary Europeans. The beneficial effects of these low speeds are not reflected in the effective temperature scale, which makes no allowance for speeds lower than 20 ft. per min.

In the hot, wet tropics the heat stress is generally much the same indoors and out of doors; the effects of radiation outdoors are roughly balanced by those of air movement. Even in hot sunshine effective temperature is a fairly good criterion of heat. Effective temperatures adjusted for radiation by using the temperatures shown by a black globe thermometer instead of the shade air temperatures give unduly high results, the threshold for marked discomfort being about 90°F. instead of the 83°F. found for indoor conditions. On the other hand, when for outdoor observations the readings of a globe thermometer loosely covered in white drill are used for computing the effective temperature the threshold for marked discomfort is about 85°F.

An effective temperature of about 82°F. or a screen temperature of 80°F. represents the maximum tolerable conditions for refreshing sleep.

In conclusion the author remarks that only at few times Europeans reasonably clothed and doing light work meet with serious environmental discomfort, but in spite of this life in the tropics is enervating, and adequate spells in a temperate climate are required.

Details of the statistical analysis of the observational results are given in an appendix.

Thomas Bedford

SANGIORGI, G. *Clima ed acclimatamento. [Climate and Acclimatization]* *Igiene e San. Pubblica.* Salerno. 1953, Jan.-Feb., v. 9, Nos. 1/2, 11-37.

This is a review of the subject in very general terms. It is not a detailed review of the literature, but rather a summary of general impressions. The bibliography consists of a list of 7 books on the subject, 5 in Italian and 2 in French.

Charles Wilcocks

MISCELLANEOUS DISEASES

Coudreau, H. Aspects cliniques et radiologiques des localisations pulmonaires de la mélioidose (à propos de deux observations). [The Clinical and Radiographic Appearances of Melioidosis affecting the Lungs, with a Report of 2 Cases] *Méd. Trop.* Marseilles. 1954, July-Aug., v. 14, No. 4, 435-47, 2 charts & 5 figs. on folding pl.

The author reports, from Hanoi, two new cases of melioidosis. At the onset both resembled cases of severe pneumonia but later showed characteristic remissions and relapses without corresponding variations in the pulmonary signs. The radiographic appearances of the lungs in Case No. 1 suggested pyaemic abscesses, but no fluid levels were seen. A blood culture made during the second febrile period remained sterile but during the next exacerbation *Pfeifferella whitmori* was cultured from the blood and was found in the sputum shortly before death. The disease may have been modified by penicillin and sulphadiazine in the early stages but it progressed subsequently in spite of treatment, successively, by chloramphenicol and chlortetracycline [aureomycin]. At autopsy multiple abscesses were found in both lungs and the hilar lymphatic glands also contained the causative organism.

In Case No. 2 the radiographic appearances were more suggestive of disseminated pulmonary tuberculosis and streptomycin was administered. A gluteal abscess developed and yielded *Pf. whitmori*. Treatment with chloramphenicol was then instituted and recovery ensued.

The author reviews 6 other cases successfully treated by chloramphenicol, sometimes in combination with chlortetracycline. It is considered that organisms remaining in healing pulmonary lesions or in lymphatic glands may be responsible for late relapses in chronic cases.

[See this *Bulletin*, 1954, v. 51, 840; 1953, v. 50, 452.]

Frederick J. Wright

Deschiens, R. Étude comparée des hyperéosinophilies en fonction de leur étiologie. [Comparative Study of Hyper-Eosinophilia in relation to Aetiology] *Ann. Inst. Pasteur.* 1955, June, v. 88, No. 6, 679-98. [81 refs.]

The author discusses the conclusions to which his observations on high degrees of eosinophilia in man and in animals (cats, dogs and guineapigs) have led him [see also this *Bulletin*, 1953, v. 50, 760, 761, 978; 1954, v. 51, 433, 512, 513; and 1955, v. 52, 415 and 563], and their relationship to their aetiology. Hypereosinophilia can be differentiated into two broad types by a study of its frequency and intensity, of its evolution and course, and of its susceptibility or resistance to the eosinopenic hormones, corticotrophin and cortisone.

The two types are those due to parasitic infections and those not due to parasitic infections. That due to parasitic infections is characterized by the regularity with which it is produced by the exciting agent and by its persistence, though the degree varies with a number of factors; by a characteristic curve of evolution and decline; and by the fact that it is rarely reduced by treatment with corticotrophin or cortisone if the degree of eosinophilia is greater than 30 per cent.—if it is less than 20 per cent, it commonly is reduced by these drugs.

That not due to parasitic infection is usually irregularly invoked by the exciting agent; there is variability of its intensity, which usually is low

(under 20 per cent.); and it is susceptible to corticotrophin or cortisone. There are exceptions in this type such as the tropical eosinophilias which, of course, may be due to some unknown parasitic infection.

A. R. D. Adams

BOLT, N. A. Een geval van favisme. [**A Case of Favism**] *Nederl. Tijdschr. v. Geneesk.* 1955, June 4, v. 99 (ii), No. 28, 1651-5. [18 refs.]

The English summary appended to the paper is as follows:—

“ Report on a case of ‘ favism ’ in a child, i.e. an allergic form of acute haemolytic anaemia caused by contact with pollen or seed of *Vicia faba* or broad beans. This was probably the first case observed in the Netherlands. It is important to consider ingestion of fava beans as a possible cause of haemolytic anaemia in cases of unknown origin, in order to prevent recurrence of the symptoms.”

HIGGINSON, J. **Siderosis in Southern Africa. A Review.** *Central African J. of Med.* 1955, May, v. 1, No. 3, 104-11, 6 figs. [32 refs.]

“ The territorial distribution and clinical features of the excessive haemosiderin deposits frequently observed in the South African Native are reviewed. The morbid anatomical and histopathological features of the condition are discussed and compared with those of classical haemochromatosis. It is shown that there are several distinct differences which militate against the conditions having a common aetiology. The possible aetiology of the condition is discussed, and it is considered that excessive oral iron intake is the factor of major importance.”

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

KHATTAT, F. H. **An Account of the Taxonomy and Biology of the Larvae of Culicine Mosquitoes in Iraq. I. Central Iraq.** *Bull. Endem. Dis. Baghdad.* 1955, Jan., v. 1, No. 2, 156-83, 4 figs. & 8 pls. [17 refs.]

The author presents an account of the larvae of some culicine mosquitoes which he obtained in Central Iraq during a short survey in the autumn and early winter of 1954.

Eight species were collected and were identified as *Theobaldia longiareolata*, *T. subochrea*, *Culex pusillus*, *C. tritaeniorhynchus*, *C. pipiens*, *C. theileri*, *Aedes caspius* and (for the first time) *Uranotaenia unguiculata*.

The mosquitoes are considered separately with brief biological notes; important morphological characters are illustrated and certain features of larval chaetotaxy are compared in 2 tables. A detailed description is given of one typical mosquito breeding place near Hilla. H. S. Leeson

SILVERMAN, P. H. & LEVINSON, Z. H. **Lipid Requirements of the Larva of the Housefly *Musca vicina* (Macq.) reared under Non-Aseptic Conditions.** *Biochem. J.* 1954, Oct., v. 58, No. 2, 291-4, 2 figs. [17 refs.]

The authors have shown that the house-fly *Musca vicina* requires only one essential lipid which is contained in the sterol fraction of the wheat-bran medium and identified as sitosterol. This sterol, however, was shown to be a relatively non-specific requirement as it could be replaced by 3 related compounds. Cholestan-3-one, on the other hand, acted as an antagonist of the normal "active" steroids.

The sterol required by this species is discussed by the authors with regard to its rôle as an agent in larval resistance to bacterial infection, as a pupation factor, as a growth promoter.

A constant temperature of the medium was shown to accelerate growth and pupation when compared with breeding methods at uncontrolled temperatures.

J. S. Harington

LEVINSON, Z. H. & SILVERMAN, P. H. **Studies on the Lipids of *Musca vicina* (Macq.) during Growth and Metamorphosis.** *Biochem. J.* 1954, Oct., v. 58, No. 2, 294-7. [16 refs.]

The authors have studied the changes in the moisture and lipid content of the house-fly, *Musca vicina*, during growth and metamorphosis.

The difference in water content between the various stages was found to be insignificant, except the drop in water content during pupation which is regarded as being due to the formation of the puparium rather than an actual loss in water.

The lipid content rose substantially over 7 days up to the late third-stage larva. Within 24 hours of the onset of pupation there was a considerable drop in fat content.

The fat of the adult on emergence appeared to contain a significantly higher proportion of shorter-chain fatty acids. Sterol and unsaponifiable lipid contents seemed to remain relatively constant during growth and metamorphosis. During larval growth the fatty acids of the dietary medium were laid down in their unsaturated states; at the onset of pupation they were found to be either saturated or broken down into shorter-chain fatty acids.

J. S. Harington

VARGAS, L. Relación de los dipteros de las miasis de México. [Relation of Diptera to Myiasis in Mexico] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 209-14.

The English summary appended to the paper is as follows:—

"The author presents a list [of] old Mexican species of Diptera whose larvae causes myasis. 29 species distributed in 10 families are recorded."

VARGAS, L. Nota sobre las moscas sarcófágidas de México (Insecta, Diptera). [Notes on Sarcophagid Flies in Mexico] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1954, Dec., v. 14, No. 4, 203-7.

The English summary appended to the paper is as follows:—

"The author discusses in general the systematics, morphology and life habits of the sarcophagidae flies. In the list of Mexican species 15 genera, 55 species and 1 subspecies are recorded. In Mexico this family has received little attention."

THEILER, Gertrud & HOOGSTRAAL, H. **The Identity of *Ornithodoros savignyi* (Audouin, 1827) and *O. pavimentosus* Neumann, 1901 (Ixodoidea, Argasidae).** *J. Parasitology.* 1955, June, v. 41, No. 3, 245-7.

"An investigation of characters proposed to differentiate *Ornithodoros savignyi* (Audouin, 1827), from *O. pavimentosus* Neumann, 1901, shows that these features amount merely to variations of *O. savignyi* apparently due to individual variation, age, degree of engorgement, and method of preservation. The name *O. pavimentosus* is therefore relegated to synonymy under *O. savignyi*."

RADFORD, C. D. **Acarology—or the Study of Mites (Acarina).** *Riv. di Parassit.* Rome. 1955, Jan., v. 16, No. 1, 41-58. [Numerous refs.]

The order Acarina (ticks and mites) contains many parasitic forms, and this paper by a well known acarologist is a useful and brief review of work done on the group. Notes on the different families of mites, their habits, habitats and disease relationships—if any—are given. The structural modifications which some of the parasitic forms possess for an ecto- or endoparasitic way of life are also mentioned. Some of the mites, the Tetranychidae for example, are plant feeders and are of considerable economic importance as they damage horticultural and agricultural plants.

Those interested in the subject will find the extensive bibliography and the notes on collecting, staining and mounting mites, helpful.

M. G. R. Varma

REID, J. A. **Resistance to Insecticides in the Larvae of *Culex fatigans* in Malaya.** *Bull. World Health Organization.* Geneva. 1955, v. 12, No. 5, 705-10. [16 refs.]

"After two years' use of hexachlorocyclohexane (BHC) as a larvicide in Georgetown, on Penang Island, control of *Culex fatigans* breeding became unsatisfactory. Two laboratory colonies of *fatigans* were established, one from Georgetown, and one from Kuala Lumpur where no insecticides had been used; tests were then made to determine the median lethal concentrations (MLC) of BHC, dieldrin, and DDT for the larvae of the two strains. The Georgetown strain was found to have acquired a tenfold resistance to BHC, and also to dieldrin to which it had not been exposed, but it showed no significant increase of resistance to DDT, to which it had also not been exposed. A year later, when both strains had passed through some ten generations in the laboratory without exposure to insecticides, the Georgetown strain was found to have lost much of its resistance to BHC, although the MLC was still twice that of the non-resistant Kuala Lumpur strain."

MILANI, R. **Comportamento mendeliano della resistenza alla azione abbattente del DDT e correlazione tra abbattimento e mortalità in *Musca domestica* L.** [Mendelian Pattern of Resistance to the Knock-Down Effect of DDT and Correlation between Knock-Down and Mortality in *Musca domestica*] *Riv. di Parassit.* Rome. 1954, Oct., v. 15, No. 4, 513-42, 1 fig. [28 refs.] English summary.

One resistant and two susceptible fly colonies were used in the author's experiments. The resistant strain (*kdr;plx*) was derived from a single fertile female, collected in Latina, showing a heritable wing-venation abnormality known as plexus ("plx") as well as resistance to knock-down

by DDT ("*kdr*"). This colony was inbred for a number of generations before use, several times being maintained by a single pair.

The two susceptible colonies were (i) a strain from Tripoli, maintained in mass culture for 14 generations before use and not showing *kdr* or *plx*, and (ii) a colony derived from a single fertile female with a hereditable clear-orange-coloured abdomen ("orange"). This female came from the same population as the *kdr;plx* strain, but both she and her progeny were susceptible to knock-down by DDT.

Two rather similar tests were used for detecting *kdr*. In the experiments with mass crossings the flies were exposed to DDT residues in small glass boxes; but in the experiments with individual matings the flies were tested in a chamber formed by 2 cones of filter paper, treated as described by BUSVINE and NASH [this *Bulletin*, 1953, v. 50, 1176]. These papers were treated in a special frame which allowed paralysed flies to be removed at intervals and held in clean beakers for mortality counts. It was found that susceptible flies were paralysed by DDT in 15 to 75 minutes, whereas the *kdr* flies did not begin to fall till 6 hours and some were always unaffected after 24 hours.

The first results given show the fertility (mean oviposition number) and sex ratios of progeny, from 54 single pair crosses and 4 mass matings. The mean egg numbers range from 12.5 to 72.0. Sex numbers usually do not depart significantly from the expected 50:50 ratio. However, in 6 matings there were abnormal sex ratios and it is suggested that lethal genes on the X chromosome may be involved.

When *kdr;plx* flies were crossed with either susceptible strain, the F_1 progeny began paralysis at 27 to 33 minutes and were all knocked down between 55 and 80 minutes. These flies therefore overlapped the susceptible knock-down time (though averaging a higher figure) and were all down 4 hours before the first resistant flies. This result suggests an incompletely recessive gene for resistance.

Further matings with the F_1 generation were made, either inbreeding or back crosses to the parental strains. The resistance of the F_2 flies showed segregation into susceptible forms, paralysed between 35 and 95 minutes, and resistant flies, the first of which were not affected until 120 or 150 minutes. In order to determine whether these characteristics were constant in individual flies, survivors of the experiments were retained and retested 2 to 4 days later. All of the "resistant" group were shown to display the same result at the second test and only 2 of 597 "susceptible" flies had apparently become resistant.

In regard to the segregation of the character *kdr*, data from 11 series of tests were available, 3 involving mass matings. If resistance is due to a single recessive gene, the F_2 segregation should be 25:75 for inbred F_1 , and 50:50 for back-crosses. Eight series (including all three mass crosses) gave results consistent with this hypothesis. Of the other 3, 2 gave evidence of heterogeneity in their results from one egg batch to another, though the deviation from expected ratio was more or less consistent.

In most of the experiments, after determination of resistance to knock-down, the flies were retained to determine whether they would eventually die or recover. It was found that nearly all (about 99 per cent.) of the flies resistant to knock-down survived; but the reverse correlation was not so close, for only 63 per cent. of those sensitive to knock-down eventually died. (The survivors were analysed by grouping according to parental type, etc. without any clear conclusions emerging.)

Some data on the inheritance of the character *plexus* are given. They do not approximate to any simple Mendelian pattern. Other data are analysed

to show relationships between the character *plexus* and ultimate survival after DDT exposure in inbred crosses and back-crosses derived from the 2 susceptible strains. It was concluded that there was significantly higher survival in *plx* flies derived from crosses with *Tripoli* parents, but not from *Orange* parents.

The work of other authors is critically reviewed.

J. R. Busvine

STARR, D. F. & CALSETTA, D. R. **Ryania as a Housefly Larvicide.** *Agric. Chem.* Baltimore. 1954, v. 9, No. 11, 50-53. [10 refs.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1955, Apr., v. 43, Pt. 4, 55-6.]

Experiments are reported on the use of ryania and Ryanexcel 96-3, which is a combination of 95.8 per cent. ryania, 3.2 per cent. n-propyl isome and 1 per cent. wetting agent, for the control of the house-fly [*Musca domestica* L.], mainly in the larval stage. When aqueous suspensions of ryania, at concentrations of up to 10 per cent., were applied to filter paper in petri dishes and house-fly eggs were put on the wet paper, the percentage hatch was about the same as in untreated controls, but many newly hatched larvae died even if the concentration was only 0.1 per cent. Mixing 0.5 per cent. ryania with moist standard rearing medium just before the eggs were introduced resulted in 99.9 per cent. mortality of larvae as compared with about 10 per cent. in controls. As little as 0.1 per cent. so affected the larvae that 86 per cent. died in the larval or pupal stage and the remainder gave rise to very small adults. These adults could, however, lay viable eggs. When 0.5 per cent. ryania was mixed into the medium two days after the eggs were introduced, there was only 48 per cent. mortality. When ryania was applied to the surface of the medium, mortality was higher at high concentrations if it was watered in but at 1 per cent. or less it was lower. Ryanexcel was more effective than ryania at low concentrations, the respective mortality percentages in a comparative test being 90.3 and 78.9 with a concentration of 0.1 per cent. and 99.6 and 98 with one of 0.3 per cent. It retained its toxicity in the breeding medium for at least three weeks.

To determine the number of generations needed to build up resistance to Ryanexcel, a laboratory strain of flies was reared through 20 generations in medium treated with 0.1 per cent. and 30 more in medium treated with 0.2 per cent. Mortality fell from 91 per cent. in the first generation to 53 per cent. in the third, and then did not vary enough to give evidence of a subsequent change in resistance. The concentrations required for 90 per cent. kill in the sixth and 50th generations were not significantly different, and the selected strain was estimated to be 3-4 times as resistant as the original one. This is a very low order of resistance. Adults from surviving pupae laid fewer eggs than normal flies, and fewer of the eggs were viable.

Deposits of 200-400 mg. Ryanexcel per sq. ft. seemed more effective against adults on glass than on kraft paper, probably because they did not adhere on the glass so that, in effect, the flies were dusted. Exposure for 24 hours to 400 mg. failed to give significant kill on the paper. Ryania and Ryanexcel killed adults in 24-48 hours when added to their standard milk diet at 0.1 or 0.2 per cent. Ryanexcel gave complete mortality in 48 hours at 0.2 and 0.5 per cent. Feeding for more than two hours was necessary for a good kill. Mortality among flies given a free choice between untreated milk and milk or sugar solution containing 0.5 per cent. ryania or Ryanexcel was 60-70 per cent. in 48 hours. Ryania and Ryanexcel were less effective larvicides than malathion and γ BHC as lindane, which killed 100 and

76 per cent. of the larvae at a concentration of 0.001 per cent. However, lindane is known to be much less effective against field strains than against the laboratory one, and as malathion is extensively used as a deposit insecticide, its use as a larvicide also might lead to the rapid building-up of resistance.

In conclusion, it is stated that extensive field tests would be necessary to establish the practical usefulness of ryania, but sprinkling the floor of barns with a 5 per cent. suspension each day before the barns are cleaned and treating the barnyard with either powder or suspension about every two weeks early in the season are suggested.

CLARI, L. Prove di demuscazione delle stalle con l'Emmaton 50. [Tests of Emmaton 50 against Flies in Animal Quarters] *Ann. Sper. Agr.* Rome. (n.s.) 1954, v. 8, No. 5, Suppl., pp. lv-lxii. English summary. [Summary taken from *Rev. Applied Entom.* Ser. B. 1955, May, v. 43, Pt. 5, 80.]

In view of the development of resistance to chlorinated-hydrocarbon insecticides in house-flies [*Musca domestica* L.] in Italy, new products are being developed for their control. One of these is Emmaton 50, a proprietary emulsion concentrate containing 50 per cent. malathion. To prepare it, malathion dissolved in miscible oil is adsorbed on a fine suspension of a dispersed absorbent powder, which improves the lasting effect of deposits of the insecticide, and a small amount of molasses and substances attractive to the flies are added. A preliminary test in which the walls of a room were sprayed with 2 per cent. Emmaton 50 showed that the deposit was very effective against flies, but a disagreeable odour of mercaptan persisted for several days. This renders the material unsuitable for use in premises in which milk is handled, owing to the risk of tainting.

A further test was carried out in July 1953 in a building covering an area of some 2,000 sq. ft. in which pigs were housed. The animals were driven out before treatment, all food was covered with sacking, and the troughs were temporarily filled with straw. The internal walls and the walls, floor and ceiling of the building were then sprayed with 1.5 per cent. Emmaton 50 at a rate of just over 2 gals. liquid per 100 sq. ft. The treatment took 1½ hours to apply and at the end of it the floor was covered with dead flies and very few were still able to fly. Subsequent observations were carried out each morning and evening, and these showed that the deposit gave excellent mortality of flies for ten days and useful control for a further five, after which its effectiveness diminished. The odour persisted for five days. Some control was still being given after nearly 20 days, and an attempt was then made to reactivate the deposit by spraying it with water. This was unsuccessful. It is considered from these results that spraying with 2-2.5 per cent. Emmaton 50 would give control for 20 days.

MISCELLANEOUS PAPERS

CHAUDHURI, R. N. Tropical Medicine—Past, Present, and Future. *Brit. Med. J.* 1954, Aug. 21, 423-30. [169 refs.]

In this able presidential address, Dr. Chaudhuri outlines the advances in tropical medicine in the last hundred years beginning as it did with a

lush period of parasitological discoveries and ending with what appears to be the climax—but may be little more than the beginning—of chemotherapy, and he rightly points out that it was in the tropics that this branch of medical science first found its feet.

He then reviews the advances made in our knowledge and ability to control a number of diseases and groups of diseases that are important in India:—malaria, kala azar, the dysenteries, cholera, typhoid fever, leprosy, plague, helminthic diseases, undernutrition and specific deficiency syndromes, and poisoning from food adulterants.

Finally, he claims that the label "tropical disease" is often a misnomer and, what is worse, it perpetuates "a false idea that tropical countries, try as they may, are doomed always to suffer from these diseases" and he concludes his address in the following words: "In short, many of our so-called tropical diseases are the symptoms of backward countries and not primarily of tropical climates. Remove food deficiencies in the tropical countries and introduce all the sanitary measures now enjoyed in the West and many of the tropical diseases will be banished. Our knowledge of these diseases, their prevention, and their cure has advanced to a remarkable degree; in fact, it has outstripped its practical application. With a parallel improvement in social and economic conditions, there is little doubt that our efforts to eradicate them will be crowned with success".

L. E. Napier

WALKER, A. J. Combined Cultivation of Field and Human Resources.
East African Med. J. 1955, Mar., v. 32, No. 3, 73-8.

This paper provides a general survey of the human problems in East Africa. Much land could be developed and agriculture improved if there were the will to attempt to do so. The African lacks initiative, enterprise, mental endurance and the power of searching self-criticism. This may be due to upbringing within the framework of a rigid tribal discipline.

Remedies recommended are: the organization of agricultural communities as in some cotton-growing areas in the Sudan; a school of Work Physiology in East Africa; a study of social incentives.

A new era of public health is beginning. The problems of deaths and epidemics have been replaced by the problems of how to feed the survivors. The technological solution is outside the scope of the medical profession, but doctors will act as a liaison between sociologists and technologists and interpret the Africans' physical and social needs.

[This paper is a lively and attractive sketch, but it is undocumented and the ideas are not developed. Dr. Walker clearly has "the initiative and enterprise" to think along new lines. If he also possesses "mental endurance and the power of searching self-criticism", then we can look forward to an important new book from East Africa.]

R. Passmore

BOOK REVIEWS

ENCYCLOPÉDIE MÉDICO-CHIRURGICALE. 1955, Recueil No. 6, Cahier 31, loose leaf pp., numerous figs. [Numerous refs.] **Maladies infectieuses** [DEBRÉ, R. (Edited by)]. **Maladies parasitaires** [AUBRY, G. (Edited by)]. Paris VI^e: Editions Techniques S.A., 18, rue Séguier.

Readers of this *Bulletin* may be interested to know of the existence of this *Encyclopédie Médico-Chirurgicale*. It is published as a series of *cahiers*,

of which 54 are issued each year—2 *cahiers* for each group of subjects. The page measures 32 x 27.5 cm. and the print is in two columns. The publication has been in existence for 26 years, and the *cahier* now reviewed is No. 31 of 1955, dealing with anthrax [mistranslated as "Carbuncles" in the English list of contents], rabies, yaws, ankylostomiasis and ascariasis. There are also 12 additional short notices on various subjects, including vitamin K in leprosy, nephropathia in malaria and the treatment and prophylaxis of malaria, and the treatment of tapeworm and threadworm infections. Each of the main sections is an authoritative short monograph, and the authors are well known—rabies, for instance, is described by P. LÉPINE, yaws by J. LÔBO of Recife, Brazil, and ascariasis by R. MANDOUL. The language throughout is French. The papers are illustrated and the diseases are dealt with systematically.

The encyclopaedia is meant to be kept up to date by the issue of new parts; it is obviously valuable, and it has the merit of including short bibliographies of literature relevant to each section. *Charles Wilcocks*

FAUST, Ernest Carroll [M.A., Ph.D.]. **Animal Agents and Vectors of Human Disease.** 660 pp., 216 figs., 9 pls. (1 coloured). 1955. London: Henry Kimpton, 25, Bloomsbury Way, W.C.1. [70s.]

The first question the reader will ask about this new book on parasitology is how does it differ from its well-known forerunner, CRAIG and FAUST's *Clinical Parasitology*? [this *Bulletin*, 1951, v. 48, 1159]. The latter has served as a scientific textbook on tropical medicine for the last 18 years, omitting only the sunstrokes, moonstrokes, etc., of the more formal books on the subject; Faust's new book is more restricted and less clinical in its scope, with the emphasis—as its title suggests—more on the parasite than on the reaction of the host. Enough is given, however, about the pathogenesis of most infections to satisfy the medical man who needs a concise account of the subject; at the same time, the broad cover is useful to the zoologist or public health worker who is involved in these problems.

The first section of the book deals in the usual way with the nature of parasitism, but includes also a number of tables which summarize general data in a novel and interesting form for reference purposes. These tables comprise (1) the natural history of human parasites, (2) their systematic classification, (3) pathological and clinical effects, (4) organs in relation to parasites, and (5) therapeutic agents.

The next four sections deal in a standard way with protozoal and helminthic parasites of man; each parasite is discussed under 7 headings—history, epidemiology, morphology and life cycle, pathogenesis and symptomatology, diagnosis, treatment, and control, much in the same manner as the subject is described in *Clinical Parasitology*, though in less detail. Another section concerns the larger animals which are harmful to man, from jellyfish, barracuda and reptiles to the duck-billed platypus and vampire bat.

An important section is devoted to the arthropods which affect man either directly, like scorpions or spiders and in fact all arthropods which bite or vesicate, or indirectly as vectors of disease. An interesting account is given of the different ways in which an arthropod produces substances poisonous to man, as vesicants, urticants, toxins, or sensitizing agents. A short entomological section follows, considered in relation to these subjects and to control; here some overlapping occurs, because the subject of control has already been briefly treated under the parasite carried by the arthropod, and will be mentioned again later in the section on arthropods as vectors of human disease. The too logical arrangement of the book breaks down here,

and it would perhaps be more satisfactory to transfer much of this section to the respective parasites concerned. Again there is the difficulty of knowing where to place the bacteria, spirochaetes, rickettsiae, let alone the viruses; they are relegated here to a chapter on the arthropods, instead of taking their true place (as in BRUMPT's *Précis de Parasitologie*) with the other agents of disease.

The last section of the book describes the various techniques used in parasitology—observation of the organism, cultural methods, immunological tests and preservation of material. The practical man will turn to this chapter, and even if he is unable to find full details here, good references direct him to the original source.

The book is well illustrated with plentiful maps, showing distribution of parasites or vectors, with drawings of organisms and arthropods and with clever diagrams of life cycles. Many of them are taken from earlier works, but some are new and very striking, like the outline drawings of nematodes, or the life cycle of *Trypanosoma cruzi* (though here it looks as though the dog is directly infected from the rodent). The single colour plate is of intestinal protozoa stained with iodine, and is not particularly good. It would have been better to have had a colour plate of the malaria parasites, because stippling in black-and-white, the method employed here, is a poor substitute.

This book should prove of great value to those requiring quick and easy information on the subject. It is up to date and each chapter has an extensive bibliography.

P. C. C. Garnham

I. BRAUNS, Adolf. **Terricole Dipterenlarven** [Larvae of Diptera of Woodland Soils]. Eine Einführung in die Kenntnis und Ökologie der häufigsten bodenlebenden Zweiflüglerlarven der Waldbiozönose auf systematischer Grundlage. 179 pp., numerous illustrations. 1954. Göttingen: Frankfurt: Berlin: "Musterschmidt". [28s.]

II. **Puppen terricoler Dipterenlarven** [Pupae of Diptera of Woodland Soils]. Eine Einführung in die Kenntnis der Ruhestadien bodenlebender Zweiflüglerlarven der Waldbiozönose auf systematischer Grundlage. 156 pp., numerous illustrations. 1954. Göttingen: Frankfurt: Berlin: "Musterschmidt". [43s. 6d.]

These are companion volumes, intended not only for the specialist but also for others working in allied fields of soil biology. The presentation is clear and concise, and the approach essentially practical throughout both volumes.

Undoubtedly these two works merit a place on the shelves, or perhaps in the pockets, not only of soil-entomologists and dipterists, but of all interested in the biology of soils, particularly those of Europe.

The families of medical importance in tropical regions do not receive special mention in this work, but are dealt with on the basis of their importance in the European soil fauna. For example, the *Psychodidae* and *Tabanidae* receive relatively brief treatment, as compared say, to the *Tipulidae*.

The first volume deals with the larval stages of Diptera encountered in soil, with emphasis on the forms most commonly encountered in the European woodland zones. The first main section, entitled the Specialist Section, comprises a key to the commonest larvae of woodland soils; followed by short accounts of the diagnostic characters and general biology of the larvae of the various families.

The second section, Soil Biology, outlines the scope of the author's investigations and the methods used in the collection of material from the field. It goes on to discuss the adaptation and modifications of structure and behaviour, by means of which the soil-living larvae are able to exploit the habitat. The latter part of this section gives some account of the general ecology of dipterous larvae in the soil, and discusses their position in relation to the rest of the woodland plant-animal society as a whole. This section concludes with a useful general discussion of the significance of dipterous larvae in soil biology.

The third part of the book, the General Section, outlines the morphology of dipterous larvae for the benefit of the non-specialist, and explains briefly the basis of the systematic classification.

The text is followed by 10 pages of references, and an index. At the end of the book are grouped the many excellent line illustrations, together with a number of coloured reproductions, illustrating the essential features, structural and biological, of the larvae of each family dealt with in the text. Several tables indicate the seasonal incidence of the various families. Finally, an elaborate diagram endeavours to show the overall ecological structure of the soil fauna and flora. This diagram, although a valuable feature, is rather overwhelming at first sight. It is reproduced again, as an insert, at the end of the second volume, on a much larger scale.

A number of photographs illustrate the characteristic features of various kinds of woodland, which constitute specific varieties of the generalized woodland habitat.

The second volume is essentially a continuation of its predecessor and deals in a similar way with the prepupal and pupal stages of the Diptera of European woodland soils. The 50 pages of illustrations grouped at the end of the text are again a very valuable feature.

The publishers have served the author well, for the quality of paper and printing, and also the binding, are excellent, and supplement the practical value of the two volumes.

D. M. Minter

It is with the greatest regret that we record the death on 28th August 1955 of Andrew Topping, C.M.G., T.D., M.A., M.D., F.R.C.P., D.P.H., Dean of the London School of Hygiene and Tropical Medicine and Member of the Honorary Managing Committee of the Bureau of Hygiene and Tropical Diseases since 1950.

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